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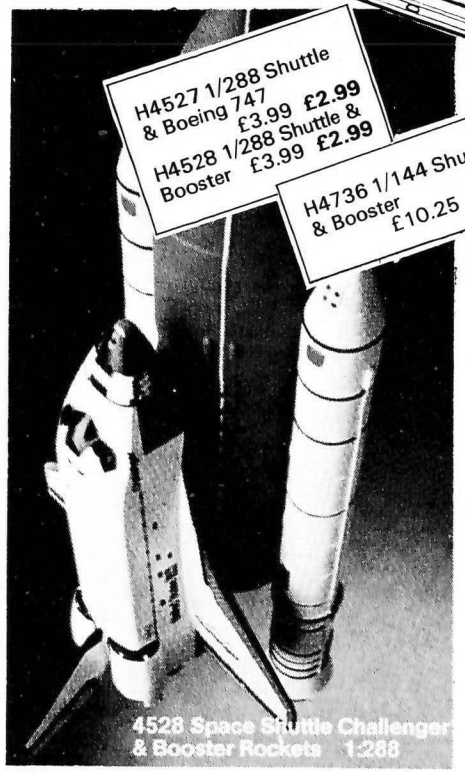


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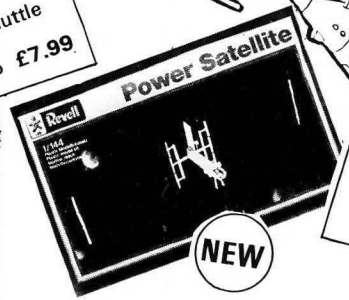


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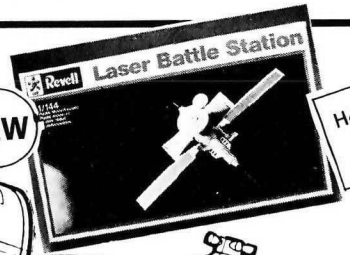


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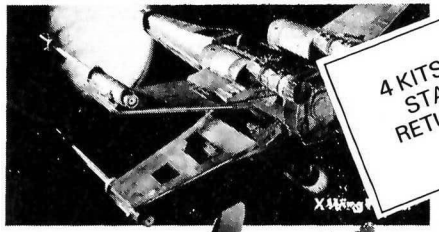

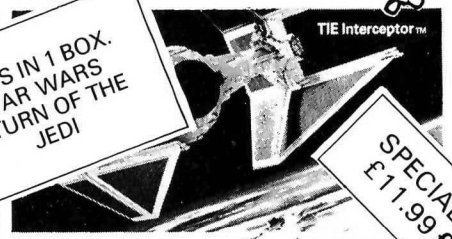


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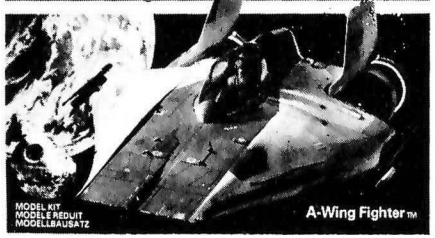


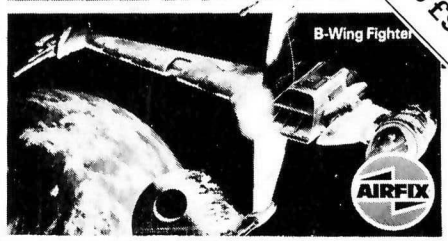

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# SPACE VOYAGER

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*Front cover illustration by David Hardy. For more of David Hardy's work, see page 31. Back cover: Boba Fett and IG-88 in a scene from* The Empire Strikes Back. Photo: Lucasfilm, courtesy of 20th Century Fox.


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# CAPTAIN'S LOG

Star interviews, manned spaceflight, exploring asteroids, SF film reports, model-building, astronomy, computers and prize competitions all feature in Space Voyager this time round.

### Star Trek III

The big news in the film business as we go to press is that the release date of the third Star Trek movie, *The Search For Spock,* has been brought forward to July 27th. The film's UK distributor, UIP, seem to be banking on the Star Trek name to guarantee good box office, because there is almost no pre-release publicity material or information available. However, Wendy Graham has managed to piece together a preliminary report. In the next issue, we are planning to publish a full colour major review of the film – by hook or by crook!

Helen Slater (star of the Supergirl movie), Dennis Lawson (alias Wedge Antilles in the Star Wars films) and Thom Christopher (the Hawk man in the Buck Rogers television series) all talk to Space Voyager about their experiences in the SF film business.

### Manned Spaceflight

David Hardy speculates on how we might travel across the unimaginably wide oceans of space to the nearest stars. Did you know that Britain had plans for a manned, reusable Space Shuttle before America? Wendy Graham interviews the project leader. Also on the theme of manned spaceflight, we report on the super-gadget of the space shuttle programme – the Manned Manoeuvring Unit (MMU) that allows astronauts to fly freely in space near their spacecraft without being attached to it for the first time. In addition, we have photos of American and European astronauts at work and play inside Spacelab.

### Model making

Revell have now released the second series of their limited production History Makers. Jones Models (Chiswick) Ltd have kindly given Space Voyager three of these kits for review. In this issue, we review the smallest and simplest of the three, the Nike Ajax missile. In the next issue, we follow up with the Jupiter C rocket and launch tower assembly, and the Rolls Royce of the range, the Apollo Lunar Spacecraft.

### Rocks in space

Asteroids are funny things, aren't they? Or perhaps you've never thought much about them? They while away their time roaming around the Solar System in darkness, most of them invisible and unknown to us. Yet, because they have no atmosphere and no contact with other weathering agents, their surfaces and interior structures record the origins of our planetary system. They also hold valuable reserves of minerals, which might be worth mining, but how? Dr Davies of Leicester University addresses himself to that thorny question.

One of Space Voyager's popular regulars from its younger days makes a welcome return. Randy and Jean-Marc Lofficier send us a Letter from Hollywood with all the latest news from the cinema capital.

There's something special on the astronomy front too. To a beginner in amateur astronomy, a sky studded with hundreds of randomly scattered stars can be very offputting. Patrick Moore explains how to find your way round the night sky, using a few well-known constellations as pointers to others. Kirsten McAteer also offers the beginner a comprehensive guide on how to get started in making your own observations.

### Computer choice

Dozens of computer manufacturers constantly jockey for shelf-space in the ever increasing number of High Street computer stores. It's a high-technology jungle for the consumer. We look at ten of the most popular home computers and others that are on the way up to try to make some sense of the market. Related to computers is the whole area of information technology. What does the information revolution actually mean to the likes of you and me? Space Voyager explains how computers and high speed telecommunications have joined forces to cause a social revolution, the magnitude of which we are only now beginning to realise.

### Prize competitions

The Ashgrove Press have kindly given Space Voyager a copy of Duncan Lunan's book, Man & The Planets, to offer as a competition prize. We've put together a puzzle to test your knowledge of the Solar System and added something requiring a little more lateral thought and creativity. The winner will receive a copy of the book (reviewed in Read-Out, Space Voyager number 5, October/November 1983).

### Silly-comp

Luke Skywalker seems a little non-plussed here. Why is his spacecraft draped with an excess of beansprouts? Did he upset the proprietor of a Chinese take-away? Looks like someone has attracted his attention from somewhere just out of shot – a Chinese cook after his beansprouts? Why is the spacecraft parked in a steamy river bed? Why isn't it in the municipal X-wing parking lot? Surely the rebel forces can stump up the Tatooine equivalent of 20 or 30 pence to park the odd spacecraft. Or perhaps he's recording a radio nature trail for the BBC.

Put a handful of apposite words in Luke Skywalker's mouth, or invent appropriate utterings for the off-screen attention grabber. Send your suggestion for a caption for this photo to:

Caption Competition
Space Voyager
Wolsey House
Wolsey Road
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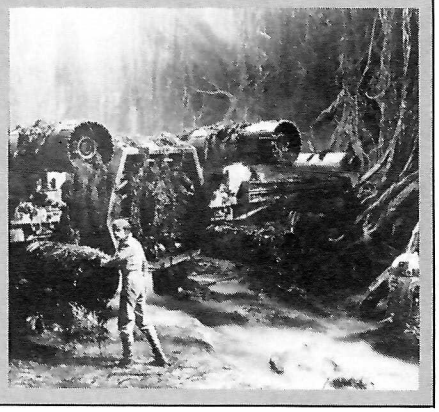
Entries to arrive by August 13th please. The winner, who will be notified by post, will receive a one year subscription to Space Voyager. The editor's decision is final (however bad his taste and judgement!).



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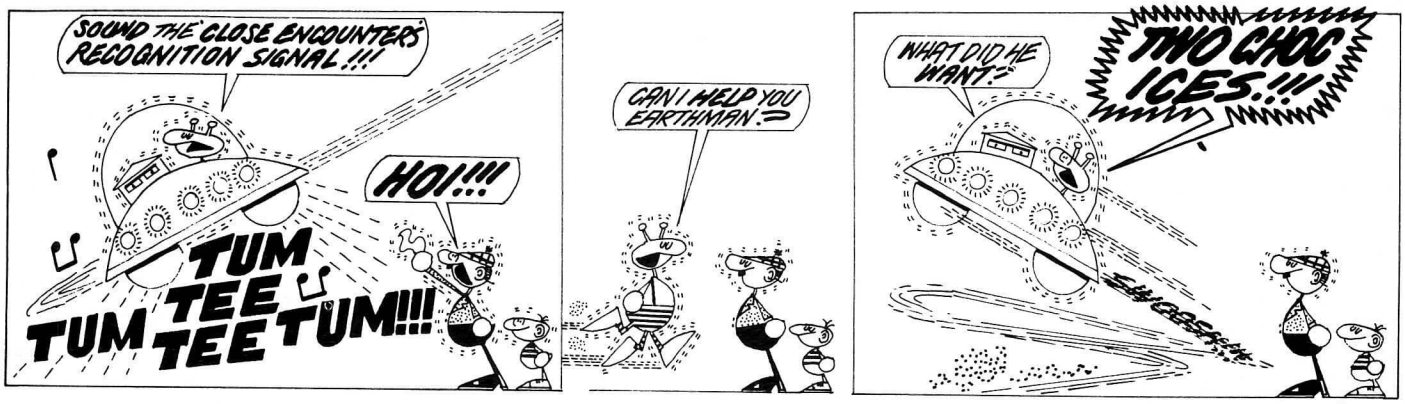
PLUTONIUM PETE

By ROBINSON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HOI!!!
TUM TEE TUM TEE TUM!!!
CAN I HELP YOU EARTHMAN?
WHAT DID HE WANT?
TWO CHOC ICES!!!

# DATA BANK

### Astro-Guiz

There were more than one hundred entries to the Astro-Guiz in issue number 8 (April/May). The answers to the ten Guiz questions are:

1. Who was the first Astronomer Royal?
Answer: b – Rev John Flamsteed
2. What is the mean distance between the Sun and Mars?
Answer: c – 140 million miles
3. What does IRAS stand for?
Answer: d – Infra Red Astronomical Satellite
4. Where would you find the Cassini Division?
Answer: b – in Saturn's ring system
5. How often does Halley's comet visit the Earth?
Answer: a – every 76 years
6. What was the first weather satellite known as?
Answer: d – Tiros 1
7. In which year was Sir Isaac Newton born?
Answer: a – 1642
8. Where is the current site of the Royal Greenwich Observatory?
Answer: b – Herstmonceux Castle
9. Who was the first astronomer to report the existence of channels or canals on Mars?
Answer: d – Giovanni Schiaparelli
10. What would a Centigrade thermometer at the centre of the Sun read?
Answer: d – 14 000 000 (14 million) degrees

And the first correct entry drawn out of the editorial hat after the May 1st closing date was from Miss Jayne Waters of Brockenhurst, Hants. She should soon be receiving her prize, a copy of Patrick Moore's History of Astronomy, published by Macdonald at £14.95 (reviewed in Read-out, April/May 1984 issue).

### New Goonhilly crockery

Britain's telephone service now allows direct dialling to no fewer than 525 million subscribers in about 140 countries round the world – and that's 90 per cent of the world's phones!

Aiding this network are two new giant dish aerials, due to come into service later this year at Goonhilly in Cornwall. One of the two new dishes, called number five, will be part of the worldwide Inmarsat maritime network. The other, number six, will be the first at Goonhilly to have dual frequency capabilities which will enable it to carry twice as much telephone traffic.

### Caption competition

The winner of the Captain's Log caption competition in the April/May issue (number 8) is Nigel Dean of Great Sankey, Warrington. He wins a one year subscription to Space Voyager, with his contribution:

***'Surely there are easier ways to cure water on the knee'.***

And that was the best!

### Reality – Beware!

Reality is under attack in the heart of London. Earth Space Port London opens for business in August. On arrival, the lucky few who have already booked their passage will be processed through Customs and teleported aboard the Starship Ultima in Earth orbit. Although the closing date for advance ticket applications was June 1st, any tickets remaining unsold will be offered for sale on the day.

In orbit, the passengers will be able to wander round the ship at leisure and visit trade cabins each offering 12 hours of entertainment. The programmes change daily. They will also see a display of space toys and models dating back to the 1930s.

The Ultima is staffed by a costumed crew. If any of the passengers arrive in alien costume, they will be able to compete for prizes. Don't forget to bring an autograph book – you never know who you might come across in the starship's corridors. If the passengers look outside the ship through its portholes they'll see moving starfields and hear the background noise from the engines. Clubs, Fanzines and the major toy and model manufacturers will be offered cabin space.

The Ultima is operated as part of Space-Ex 1984 and presented by ISTRA (UK), the Interplanetary Space Travel Research Association, founded in 1957. Unlike other space societies, which usually plump for either spaceflight fact or science fiction coverage, ISTRA straddles both areas of interest. It promotes interest in space, astronomy, science fiction and UFOs. ISTRA also issues a number of newsletters and enthusiast publications. If you'd like to know more about ISTRA membership or Space-Ex 1984, send a stamped, self-addressed envelope to Spacers, 24/25 Foley Street, London W1P 7LA. If you'd like to visit the Ultima, it will be in Earth orbit from August 6th to 11th inclusive. For details of ticket availability, contact Spacers at the above address or ring 01-631 4589.

**CONVENTION CALENDAR**
**by Marion van der Voort**

**Aug 4** COMIC Mart Central Hall, Westminster (opposite Houses of Parliament). Afternoon only. Entry free. Mart only.

**Aug 4-5** THE LEISURE HIVE Dr Who, Swindon, Wilts. Write Tony Cherrington, 2 Domestic Quarters, Bryanston School, Blandford, Dorset.

**Aug 17-19** FANDERSON 84. Guest: Gerry Anderson. London. Write PO Box 38, London W4 1QL.

**Aug 24-26** GALILEOCON 84. Star Trek. Newcastle Upon Tyne. Guests: Gene Roddenberry & Majel Barrett. Write Catherine Richardson, 30 Kirkdale Green, Rye Hill Estate, Ocford, NOT NE4 6HJ.

**Aug 24-27** OXCON SF (Unicon 5) Guest: Brian Aldiss. Write Keith Celements, 121 Drews Lane, Ward End, Birmingham B8 2QF.

**Sep 7-9** MYTHCON. Fantasy. Hull. Guests: Anne McCaffrey, Brian Froud, Dr Jack Cohen. Write Marion van der Voort, 133 Sheen Lane, London SW14 8AE.

**Sep 15** BIRMINGHAM COMIC & FANTASY MART. Methodist Central Hall. Opposite Law Courts, Corporation Street, Birmingham. Mart only. Afternoon only. Entry Free.

**Oct 6** VILACON 84. Blake's Seven, Southampton. Write Fiona McArthur, 15 Hazel Close, Charlesford, Hants.

**Oct 13** COMIC MART London, as Aug 4.

**Oct 12-14** MIDCON 84. Star Trek. Leicester. Guests: George Takei & Bruce Hyde. Write Terry Elson, 8 Ennerdale Close, Oadby, Leicester LE2 4TN.

**Oct 12-14** CONQUEST. Mainly Elfquest. Glasgow. Guests: Richard & Wendy Pini, James White. Write Pat Brown, 104 Pretoria Road, Patchway, Bristol NS12 5PZ.

**Oct 19** Hatfield Poly Con. Hatfield, Herts. Write Keith White, PSIFA, c/o Hatfield Polytechnic Students Union, PO Box 109, Hatfield, Herts.

**Oct 27-28** GALACTICON 84. Multi Media. London. Write to Eileen Wingrove, 334 Parkside Avenue, Barnehurst, Bexley Heath, Kent.

**Nov 3** BIRMINGHAM COMIC Mart. See Sep 15.

**Nov 9-11** NOVACON 14. SF. Birmingham. Guest: Robert Holdstock. Write 11 Fox Green Crescent, Acocks Green, Birmingham 27.

**Nov 16-18** FOURTH LEONARD NIMOY CONVENTION. For Nimoy the actor, Nottingham. Write Carol Davies, 77 The Ridings, Ealing, London W5 3DP.

**Dec 8** COMIC MART. As Aug 4.

**Dec 14-16** SANTACON. Media, Leeds. Multi Media. Write Santacon, 84 Ambrose Street, Fulford Road, York YO1 4DR.

# DATA BANK

### Eastercon

In the Easter of 1937, British SF fans held a convention in Leeds, an event which over the years has become a tradition. Since 1958, a convention has always been held at Easter, moving from town to town in the UK.

This year Eastercon, called Seacon this time, was held at the Metropole Hotel in Brighton and many European and American fans came. The roll-call of guests included Roger Zelazny from America, Chris Priest from Britain, Josef Nesvada from Czechoslovakia, Waldemar Kumming from Germany and Pierre Barbet from France, who is not only a writer but also a co-ordinator of the European SF Society.

The convention incorporated most of the traditions of British fandom – rooms scattered all over the hotel, programme items cancelled or retimed without warning, delegating the dealers to an airless semi-basement and an excellent bar – but it also traditionally broke with tradition, in this case not having a Banquet, and having more registered abstentions than votes for the bid for next year's Eastercon. One item that seemed most appropriate for 1984 was a Rat Room, in memory of George Orwell's notorious novel, which has predictably hit the Best seller again.

### Richard Hurndall

SF fans will have been saddened to hear recently of the death of Richard Hurndall, who so brilliantly recreated William Hartnell's first Doctor in The Five Doctors.

# NASA NEWS

### Solar Max repaired

The highlight of the past two months was of course the eleventh space shuttle flight. Challenger blasted off from Cape Canaveral on April 6th with the ambitious objective of rendezvousing with, repairing and relaunching the ailing Solar Max satellite.

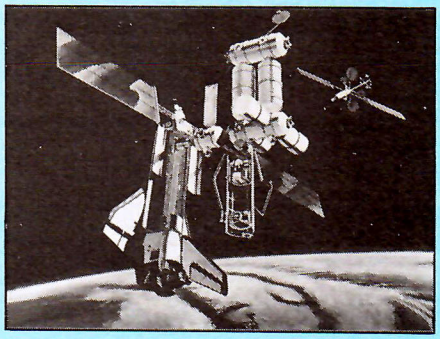
Considering the failures suffered on the previous flight, when two communications satellite were lost shortly after launch from the Shuttle, this was a very demanding mission. Success was crucial if the Space Shuttle project was not to face a severe setback. It can only pay its way as a commercial space transport if it can publicly demonstrate an excellent and predictable success rate.

The solar Max satellite, or Solar Maximum Mission to give it its full name, hadn't worked for three years. It was placed in orbit to observe the Sun, hence its name. Fortunately, it was the first satellite to be fitted with latches designed to be captured by a tool carried by the Space Shuttle. It was fortunate, because a year after launch a fuse in the satellite's attitude control system blew and put an end to its fine-pointing capability. In other words, it could no longer be pointed accurately in the required direction.

Solar Max was orbiting at an altitude of over 300 miles, forcing the Orbiter to fly higher than ever before. It was also the first time the Space Shuttle had rendezvoused with any other spacecraft. The first job was to stop the satellite spinning, so that it could be caught by the Orbiter's robot arm. George Nelson 'flew' from the Orbiter to the satellite using a jet-powered back-pack (an MMU) and tried to stabilise it. In fact, the spinning worstened.

Overnight, ground controllers were able to use the working part of the satellite's own attitude control system to stabilise it. The Orbiter manoeuvred closer to it and against most predictions, it was captured by the robot arm and lowered into a cradle in the Orbiter's payload bay for repair. It was successfully repaired, tested and re-launched, probably to the great relief of NASA officialdom.

The repair of Solar Max overshadowed all other activities on the mission. On April 7th, the crew launched an 11-ton package of experiments, which will be retrieved by another Shuttle in February 1985. It also carried millions of tomato seeds and thousands of bees in an investigation into the effects of prolonged weightlessness.



***The shape of things to come? The Orbiter docks with a future space station, perhaps built from Spacelab components and other structures. Boeing is certain to compete for business.*** **Photo: NASA via ESA.**

### Space station head

Boeing is taking the space station business very seriously indeed. The company has appointed its vice president, Robert W. Hager, to head its space station efforts. Under Hager's leadership, the space station team will actively seek significant participation in the project announced by President Reagan earlier this year.

The key role of space station development engineer will be filled by John B. Winch, who will report directly to Hager. Winch is no newcomer to space hardware research. Before becoming flight test engineer with the Boeing Commercial Airplane Company, Winch was Boeing Aerospace's Space Shuttle program manager and Lunar Rover program executive. At Boeing Huntsville, Winch was also manager and director of technical services in support of the S-1C and Saturn V launch vehicle programs. Before joining Boeing in 1966, he worked for NASA's Marshall Space Flight Centre in Huntsville, Alabama, where he made significant design contributions to NASA's Saturn program.

Boeing is convinced that the space station will be a reality within the next decade and it is determined to play a major role in the lucrative business of designing and producing the hardware used.

### Aviation safety research

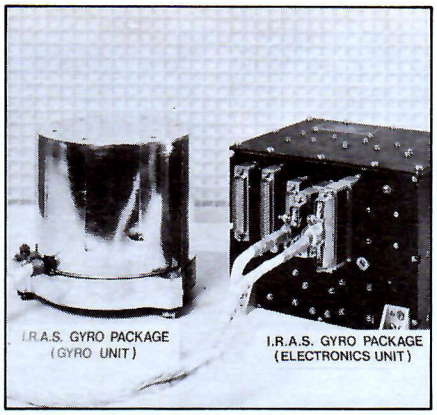
A unique new NASA research facility will allow pilots to 'fly' into crowded airports under the direction of air traffic controllers and deal with other approaching aircraft, extreme weather conditions and even mechanical failures, all from the safety of the ground.

The Man-Vehicle Systems Research Facility (MVSRF) at the Ames Research Centre in California will enable experimenters to study the influence of human factors on aviation safety. Pilot fatigue, stress and the effect of environmental factors on pilot error can all be studied in complete safety. The interactions between flight crews, their aircraft, air traffic control and as many as 36 other aircraft will be investigated.

Although simulators are commonly used today, they are mainly used for hardware and software development for on-board computer systems and for crew training, not for experimentation in human factor research. So, MVSRF is the first of its kind in the world. And

Richard also appeared in the Blake's 7 episode, Assassin, as Nebrox the old slave who helped Avon escape after the slave auction. Born in Darlington in 1910, he was trained at RADA and made his first of over 1500 broadcasts in 1933, with his first television play in 1946. He appeared in many stage productions and television plays and popular series including Z Cars, Softly Softly, Dr Finlay's Casebook, The Avengers, The Onedin Line, Van Der Valk, The Protectors and Enemy At The Door. He leaves a widow, actress Margaret Ward.

*Richard Hurndall – sadly missed.* **Photo: Essanay Ltd**




***Ferranti's gyro system – a winner in Europe. This model was fitted to IRAS, the Infra Red Astronomical Satellite. The latest order has been placed by a West German consortium.***

### British gyro success

Ferranti gyro packages are becoming virtually standard equipment on European research satellites. Now, Messerschmitt-Bolkow Blohm, joint contractors with Dornier on the German ROSAT programme, have asked the Navigation Systems Department of Ferranti plc Edinburgh to develop and manufacture an attitude sensing gyro package. They want it for a space-borne X-ray telescope to be launched by Space Shuttle in 1987. The telescope will be used to conduct a detailed survey of the sky.

that's surprising when you realise that between 60 and 80 percent of all aviation accidents involve human error to some degree.

Two simulators can be used independently for two entirely different experiments running simultaneously, or they can be run together to simulate two aircraft flying in the same airspace. The first, an Advanced Concepts Flight Simulator, was developed jointly by NASA and the Lockheed-Georgia Company. The second is a replica of the cockpit of a Boeing 727 Series 200 aircraft, built by Singer-Link of Binghamton, New York.

The view out of the simulator windows is generated by a computer system, which can produce images of any major airport in the United States, other approaching aircraft, seascapes and mountainous terrain. Various weather conditions can be programmed into these views. Sound effects in the cockpit and realistic motion complete the 'seat of the pants' feel of a real cockpit.

The 727 simulator and air traffic control simulator became operational in January 1984 and the Advanced Concepts Flight Simulator came on line in July 1984. The research facility as a whole was opened officially in May.

### Museum owns Viking

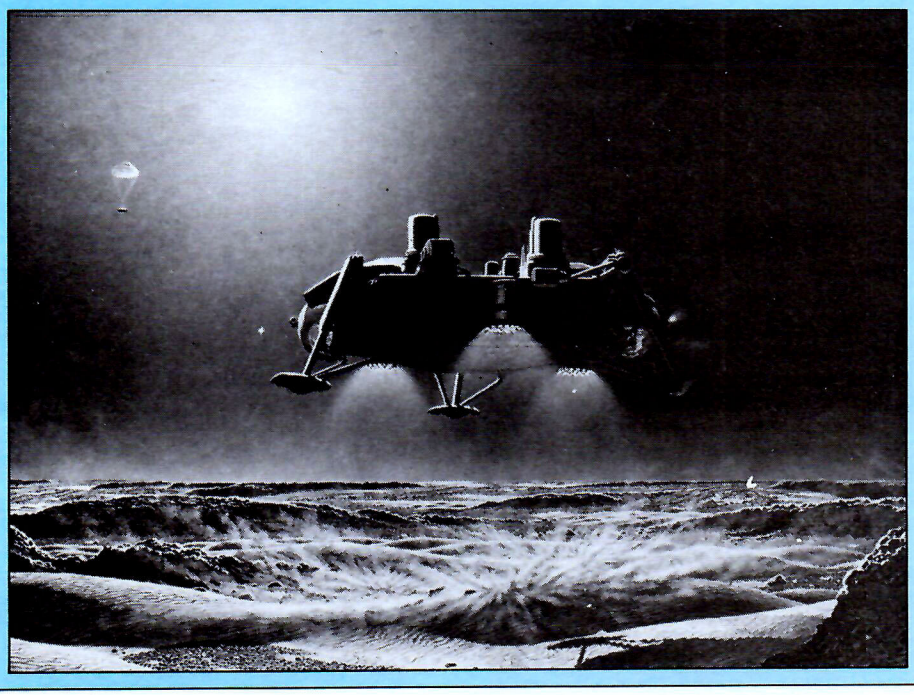
NASA has taken the unique step of transferring ownership of the Viking Lander 1 to the Smithsonian National Air and Space Museum. It is the first time that a museum has acquired an object located on another planet.

The transfer was originally requested by the Museum's Director, Walter Boyne. The lander has also been renamed as the Thomas A. Mutch Memorial Station, in memory of the Viking Lander Imaging Team Leader and NASA Associate Administrator for Space Science who died in a climbing accident in the Himalayas in 1980. The new name has been inscribed on a plaque loaned to the Museum by NASA, who will require it again when they fix it to the lander when astronauts eventually go to Mars.

The Viking Landers set down on the surface of Mars in 1976, the first American spacecraft to provide close-up views from the surface of another planet. They provided invaluable knowledge of Mars through weather observations and biological tests. More than 54 000 photographs were taken by both the landers and their orbiters. The orbiters also monitored atmospheric water vapour and temperature.

Although the Smithsonian now owns Viking lander 1, NASA has retained the right to reclaim the spacecraft for scientific purposes.

***An artist's impression of the Viking lander descending to the Martian surface. Viking Lander 1 is now the property of the Smithsonian.*** **Photo: NASA.**



### Shuttle passenger

As the pages of Space Voyager are being designed and the editorial copy typeset, the count-down to the next Space Shuttle flight in June is getting under way.

It's an important flight for two reasons. It is the maiden flight of yet another Orbiter, the third, called Discovery. Secondly, it is to carry the Space Shuttle's first commercial passenger.

McDonnell Douglas is paying the way for its chief test engineer, Charles Walker, to travel as a passenger on the mission. At only 35 years old and after only 135 hours of training, Mr Walker must be one of the most envied people in America right now. The flight will be the realisation of a lifetime dream for him.

Mr Walker isn't just going along to admire the view. McDonnell Douglas is sending him to monitor the progress of a number of the company's experiments, which will be on-board the spacecraft. The crew will also include America's second woman astronaut, Judith Resnik.

# DATA BANK

Ferranti also supplies the Inertial Measuring System that forms part of the overall guidance and control system for the Ariane launcher. Other Ferranti gyro equipment is carried by the European Space Agency's L-Sat, the Instrument Pointing System (IPS) for Spacelab and Exosat, and the joint Netherlands-US-UK infra-red satellite IRAS.

The gyro equipment carried on-board the X-ray satellite, Exosat, underwent a stiff test following the satellite's launch. There were no optical references for Exosat's gyros during the first 24 hours of its mission. When a reference became available for the gyros, the pointing error that had built up was less than 30 arc-seconds, indicating that the random gyro drift was well within specified limits.

### Model newsletter

A new source of information is now available for anyone interested in building scale models of real, rather than fantasy, spacecraft.

Michael J. Mackowski, a member of Gateway IPMS (International Plastic Modellers Society) is the editor of their quarterly *Crazed Plastic*. He has now released the first issue of The Scale Spacecraft Newsletter. It is intended to be a means by which spacecraft modellers can exchange drawings, photos, articles and other documentation of interest.

The IPMS believe that this newsletter is the first publication to meet this requirement from what they admit is a specialised field of model building. Mike Mackowski hopes that it will help spacecraft enthusiasts to pool resources and prevent duplication of effort.

The Scale Spacecraft Newsletter is available in the United States quarterly for an annual subscription of only $1.00, which sounds like a remarkably good deal. For details of European subscriptions and sample copies, contact The Scale Spacecraft Newsletter, c/o Michael J. Mackowski, 2136 Northern Limits, Florissant, MO 63031, USA.

The
SCALE SPACECRAFT
Newsletter

### Oops!

In the June/July issue of *Space Voyager* (number 9), the two picture captions at the bottom of page 46 were printed the wrong way round. The left hand screen shows Laserwarp and the right hand screen, Halls of the Things.

In the April/May issue (number 8), we neglected to credit Wendy Graham as the photographer who captured Anne McCaffrey at Galacticon. In the June/July issue (number 9), we again neglected to credit Wendy as the photographer who took the full page colour shot on page 15 of the new Dr Who, Colin Baker, and his companion, Nicola Bryant.

Finally, Space '84 will of course take place in November 1984, not 1985 as we stated in June/July's Databank!

# SOVIET NEWS

### Soviet-Indian mission

Leonid Kizim, Vladimir Solovyov and Oleg Atkov had been in their salyut space station in Earth orbit for almost two months (since February 8th), when, on April 3rd, a second Soyuz crew blasted off from the Baikonur Cosmodrome. The Soyuz T-11 spacecraft carried the first Indian cosmonaut, Rakesh Sharma. The flight commander was Yuri Malyshev and flight engineer, Gennady Strekalov.

The international crew docked their Soyuz with the Salyut station/Soyuz T-10 complex. In addition to remote sensing studies of India and the Indian Ocean from space (an experiment called Terra), the crew participated in an extensive programme of medical experiments supervised by their on-board physician, Oleg Atkov. The names of the experiments may give some indication of their purpose – Vector, Ballisto-3, Yoga, Optokinesis, Questionnaire and Poll. Atkov is particularly interested in studying the effect of weightlessness on the musculoskeletal system. Sharma is believed to be the first cosmonaut/astronaut to perform yoga in Earth orbit!

***In addition to the astronauts, cosmonauts and combined multi-million dollar/rouble space hardware of the two super-powers, the Apollo-Soyuz test project in 1975 carried a payload of tree seeds!***

As the first Indian to make it to space, Sharma is reported to have taken a handful of his country's soil, an Indian flag and pictures of his national leaders with him. He hopes that the sensing experiments will reveal substantial natural resources not visible from the ground.

The Soviet Minister of Health, Mr B. Shankaranand used the joint Soviet-Indian mission as an opportunity to stress that the Soviet Union was persuing exclusively peaceful space research in contrast with the United States, 'which develops new types of space weapons and seeks to proliferate the arms race to outer space' (quote from Novosti Press Agency release of Tass report – New Delhi, April 4th).

On April 11th, the international crew left their comrades on-board Salyut and returned to Earth. They returned, not in the Soyuz T-11 craft in which they had arrived, but in the Soyuz T-10 descent module already attached to the Salyut station.

### Soviet progress

Following the departure of the joint Soviet-Indian Soyuz crew from Salyut, an automatic Progress cargo spaceship, Progress 20, was launched towards the space station. Its cargo included 'depletable' materials – fuel, materials for experiments, life support materials and mail from mother Earth. Progress 20 was placed in a 277 by 192 kilometres elliptical orbit with a period of 88.9 minutes. The ship's on-board systems functioned normally.

It automatically docked with the space station/Soyuz T-11 complex. The station was still manned by cosmonauts Kizim, Solovyov and Atkov.

### Space walks

On April 23rd cosmonauts Kizim and Solovyov left the relative comfort of their Salyut space station to carry out some work in open space. They extracted a folded ladder, tool boxes and the necessary materials from the craft's transfer bay, took them to the worksite and fixed them in place. The two crew members were in open space for their first space walk for a total of four and a quarter hours.

Three days later they went on a second space walk. Using the tools put in place during the first space walk, they removed a protective cover from the engine module, switched off part of a conduit on the engine and installed a valve. They then switched the system on again and checked that it was airtight. The job took five hours. This was the first time that cosmonauts had serviced the Orbiter's propulsion unit in space. They reported that time had passed very quickly while they were working. They felt so comfortable working outside the craft that ground control had to persuade the two cosmonauts to return to the space station. On April 29th and May 4th, they made another two space walks, bringing their total time outside the space station to more than 14 hours. The mission continues.

### Super space saplings!

Travel broadens the mind, but in the case of a special group of trees, space travel has broadened the tree trunk.

When American and Russian spacemen joined forces in that historic Apollo/Soyuz link-up in 1975, the Russians took some tree seeds with them. On their return to Earth, the seeds were planted next to an Earth-bound control group in Moscow's Botanical Gardens.

At first there wasn't much to choose between them, but in the last three years the 'space saplings' have grown faster than the control group by at least four inches a year.

# ESA NEWS

### Challenger experiment

During the Space Shuttle Challenger's flight in April, an ESA Payload called the Ultra Heavy Cosmic Ray Experiment was launched into open space.

The aim of the experiment is to register the rare, very heavy components of cosmic radiation. It formed the largest of the 57 experiments carried on NASA's Long Duration Exposure Facility, which was placed in orbit and will stay there until it is recovered by another Shuttle next February.

After recovery, the cosmic ray experiment will be returned to ESA. The detectors will be treated and analysed at the Dublin Institute for Advanced Studies, to determine the composition of the rays. The results will provide information on the origin and propagation of cosmic rays in our galaxy as well as on the origin of the different elements of the stars, in which matter is built up in a process called nucleo-synthesis.

### Lab-1 scientists meet

The Spacelab-1 mission did not come to an end when Columbia touched down on December 8th 1983.

Short lifetime items, such as exposed films and biological samples were removed from the module immediately after landing. Following the Orbiter's return to the Kennedy Space Centre, the Spacelab with its payload was transferred to the integration facility on December 20th for disassembly.

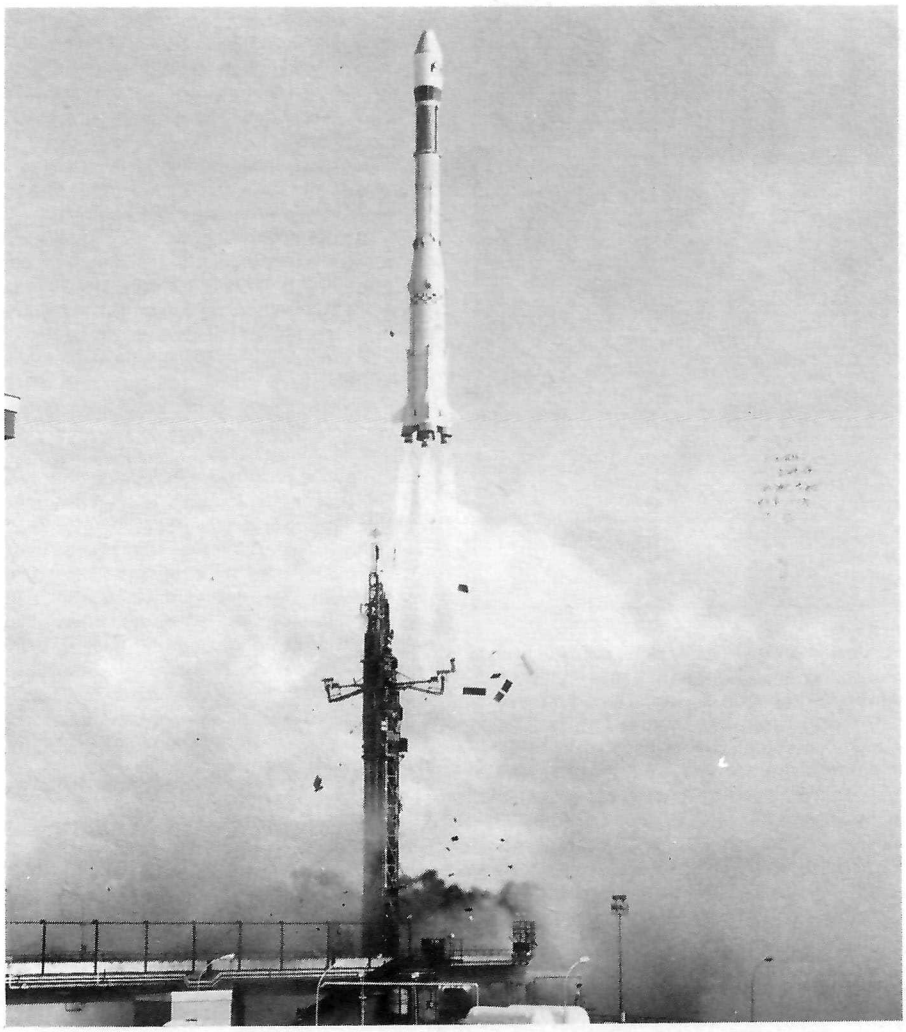
The Material Science experimental rack and one of the vestibular experiments (investigating space sickness) were sent to Germany as soon as they could be released, because they were urgently required for work on the forthcoming German Spacelab mission, D1.

The remaining hardware was returned to Europe by charter flight from the Kennedy Space Centre and distribution to the various experimenters began on February 21st.

The scientists who participated in Spacelab's maiden mission had an opportunity to discuss the mission's initial results at a three-day Spacelab-1 Science Symposium held at the Marshall Space Flight Centre in Alabama in March. Investigators preparing experiments for future Spacelab missions were also present.

Spacelab was developed and built by the European Space Agency. The first mission involved scientists from ESA member states, the United States, Canada and Japan.

*Ariane, now under the management of Arianespace, has placed the American communications satellite Spacenet in orbit.* Photo: ESA.



### Lasers in space

In March, the European Space Agency organised an international conference on Space Laser Applications and Technology (known by the appropriate acronym – SPLAT!).

The SPLAT conference, held in Switzerland, brought together specialists in laser techniques, the manufacturers of space hardware and the potential users. Discussions ranged across areas such as space telecommunications, geophysics, atmospheric studies and space navigation.

In telecommunications, lasers could effectively replace microwave transmission. In fact, ESA has been carrying out some research in this area already. It is developing a transponder (a transmitter designed to operate automatically once triggered by a signal) capable of communicating directly between two satellites without any ground link by means of a laser beam. The use of lasers would reduce the number of transmission errors and increase the amount of data carried.

### Spacenet in orbit

Ariane blasted off on its latest launch task on May 22nd. It was a flight of firsts.

This was the first launch to be managed by Arianespace, a private company set up to take over control of Ariane once the rocket had finished its development programme. France, as the major funding nation of the Ariane programme, will reap most of the profits from the reported £500 million order book. Britain has a shareholding of about 2.5 per cent.

This time Ariane was carrying a very precious payload – a communications satellite. Perhaps that sounds quite run-of-the-mill. However, this is a very special communications satellite. Spacenet is the first American satellite to be entrusted to a foreign launch organisation, an important step for Ariane, which is the American Space Shuttle's major rival for business. Spacenet will relay telephone, video and computer data communications across the United States.

# THE INFORMATION REVOLUTION

INFORMATION ITSELF HAS BECOME A POWERFUL FORCE IN OUR SOCIETY. BUT HOW HAS IT CAUSED A REVOLUTION AND WHO IS LIKELY TO BENEFIT FROM IT? IAN GRAHAM REPORTS.

Just as revolutions in agriculture and industry changed the face of our society in the past, we are now undergoing what has become known as the information revolution. The technology involved, the so-called 'information technology' or simply IT, depends for its existence on high speed microelectronics and consequently owes its birth to the spin-off technology from military and civilian communications and spaceflight programmes. There, the need to process lots of information very quickly and get it from one place to another quickly led to the development of communications networks capable of handling computerised data.

As warfare strategists began to concentrate on the importance of the guided missile and its navigation and evasion of detection, electronic warfare became more prominent. That area of research produced extremely complex data processing hardware, some of which was suitable for use in space-borne systems. Running on a parallel path, civilian space programmes also had a need for very reliable, compact navigation and control systems. The business community, too, or at least the multinational members of it, also had a need for the rapid transmission of business information from one office to another or one continent to another.

Over the past 20 years, and particularly in the past ten years, data processing has assumed even greater importance with the advent of the small, very powerful and relatively inexpensive computer, which almost any business, however small, can take advantage of. Now, almost any home computer user can communicate with other home computer users by sending data from one computer to another along telephone lines, and by using satellite links, even communicate with computers on the other side of the world.

## What revolution?

How on Earth can information cause a revolution? Have you noticed it? Has your life undergone an information revolution? Probably not. So where has the revolution been making itself felt?

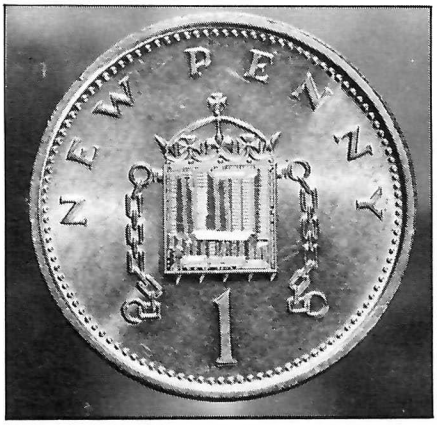
The inexorable advance of computers of all shapes and sizes into the business world has been linked to new, better quality, high speed communications to allow businesses and governments to send information from one place to another extremely rapidly. Also, using computers, existing information can be put to better use. Computers can get more from the analysis of a computerised store of information in much less time than a human analyst working his way manually through a filing cabinet.

What does all that mean and what effect does it have on the ordinary person in the street? Well, it's almost impossible to go through life now without some evidence of your existence appearing on a computer file somewhere. Your electricity, gas and water bills are probably prepared by a computer. If you have a credit card, your credit transactions will certainly be stored in the card company's computer. There is an additional implication here in the hypothetical (one hopes) realms of personal surveillance. By examining a credit card computer, if someone wished to they could track your movements as the names and addresses of the shops you had visited appeared one by one on the computer file.

If you have a bank account, your details are stored on a computer. It's impossible to get away from them. But that's hardly a revolution, any more than replacing a manual typewriter with an electric or electronic model is a revolution. It just allows more of the same work to be done more quickly, because the hardware, the machinery, is more efficient, easier to use and better suited to its task. The revolution has been brought about as far as the general public is concerned because not only has the new technology made certain things possible that weren't possible before (high speed data processing and communication), but also because the price the customer has to pay for buying or renting the hardware and services offered has fallen dramatically in recent years. Now, anyone can have in their home the same sort of information handling service that big businesses use and it's that access to information and services previously denied to the consumer that is so revolutionary.

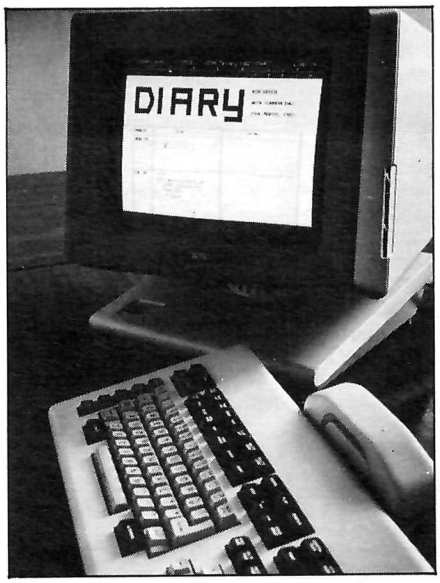
## The electronic postman

Considering the amount of high technology products to be found in the average office, it seems ironic that much of the information that passes between companies takes the form of handwritten or typewritten messages on sheets of paper, which have to be put inside envelopes and carried by hand, lorry, train, etc overland to the addressee. It's perfectly possible for these messages to be sent as computer data down the telephone line from one

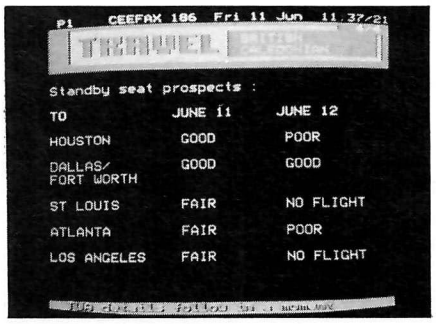


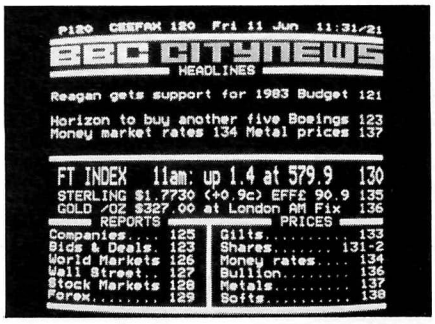

*The microprocessor – the data processing chip at the heart of the information revolution. This particular example is a Ferranti F100-L.* Photo: Ferranti.

*The electronic office. A computer keyboard and television screen have replaced the traditional office work-horse, the typewriter. This scene was photographed in the Dover offices of the TVS regional television station. The computer is part of a computerised news gathering and processing system called Newspeed.* Photo: Protel Computers.




*Here, the office of the future is actually at the British Rail Computing Strategy Unit prior to installation at British Rail Engineering Ltd at Derby. The office computer system can replace many of the more traditional paper and pen tasks, such as keeping a diary.* Photo: Crown copyright, Department of Industry.


P1 CEEFAX 186 Fri 11 Jun 11.37/21
TRAVEL
Standby seat prospects :
TO JUNE 11 JUNE 12
HOUSTON GOOD POOR
DALLAS/ FORT WORTH GOOD GOOD
ST LOUIS FAIR NO FLIGHT
ATLANTA FAIR POOR
LOS ANGELES FAIR NO FLIGHT


P120 CEEFAX 120 Fri 11 Jun 11:31/21
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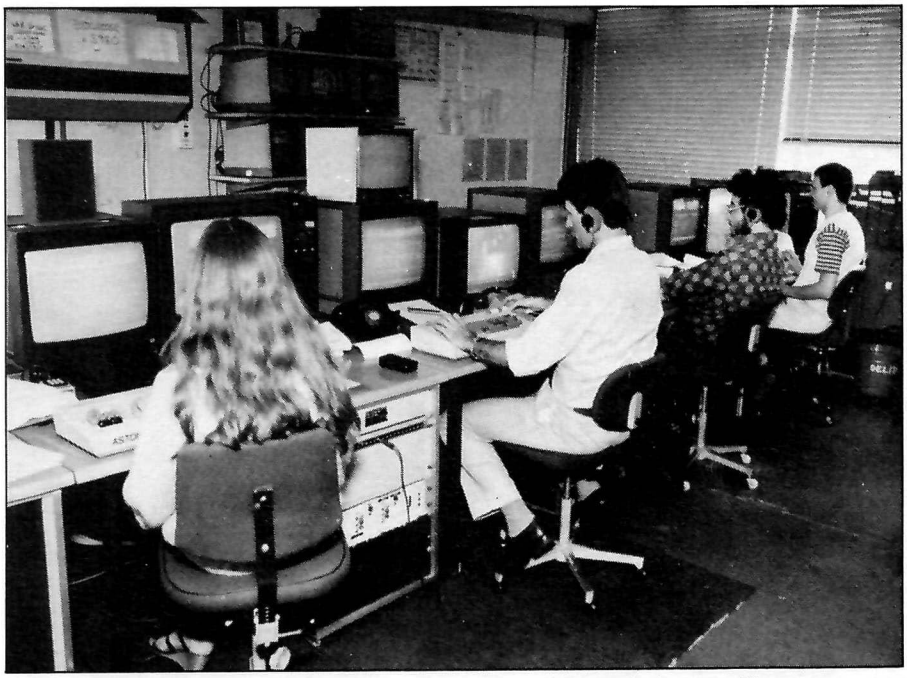
STERLING $1.7730 (+0.9c) EFF£ 90.9 135
GOLD /OZ $327.00 at London AM Fix 136
REPORTS PRICES
Companies... 123 Gilts... 133
Bids & Deals. 123 Shares... 131-2
World Markets 126 Money rates... 134
Wall Street.. 127 Bullion... 136
Stock Markets 128 Metals... 137
Forex... 129 Softs... 138

*Screens or pages full of information are broadcast with your television programmes. If you have the right equipment, a teletext television set, you can 'dial up' any of the pages transmitted using a numerical keypad on the set's remote control handset.* Photos: CEEFAX.



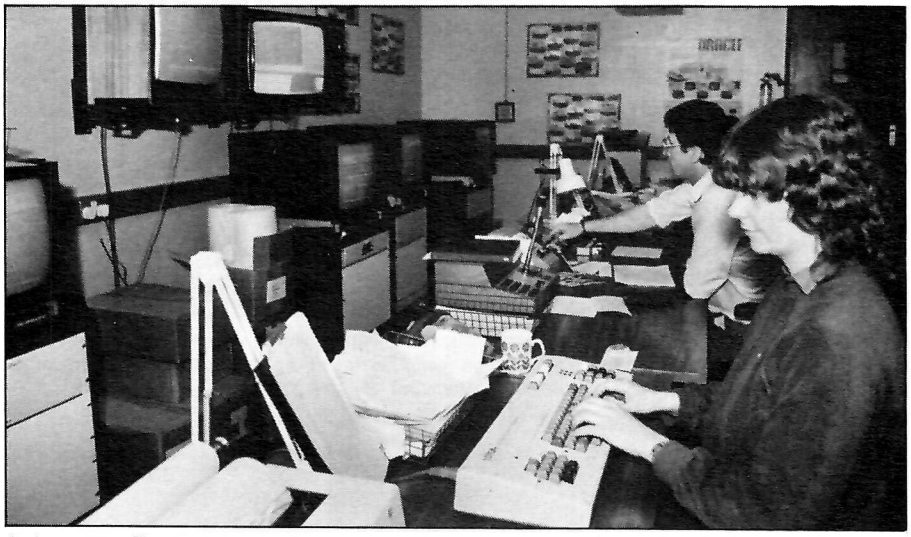
*CEEFAX pages are continually updated by a team of journalists and editors working at computer terminals.* Photo: CEEFAX.

computer to another (a process called electronic mail) and indeed some large companies already communicate in this way.

Not every business has the funds or motivation to set up its own electronic mail system, so other companies have stepped in to fill the gap. Now, whether you're a private individual or a limited company, you needn't have your own mail system – you can use someone else's. In the UK, you can hire an information and communication service called Prestel. As it maintains a physical connection (the telephone line) between you, the subscriber, and the central computers, you can actually ask the computers questions. You can request to see particular information on your screen at home. Perhaps you want to see the latest international news, or a weather forecast, or the inter-city train timetable, or if a particular flight has landed at your nearest airport. All sorts of 'information providers' put information about their business or services into the system. Most of it is available to the public, but if you're a company using the system to send sales information to all your branches, then it can be arranged that the information can only be accessed by your branch members and no-one else – a Closed User Group (CUG).

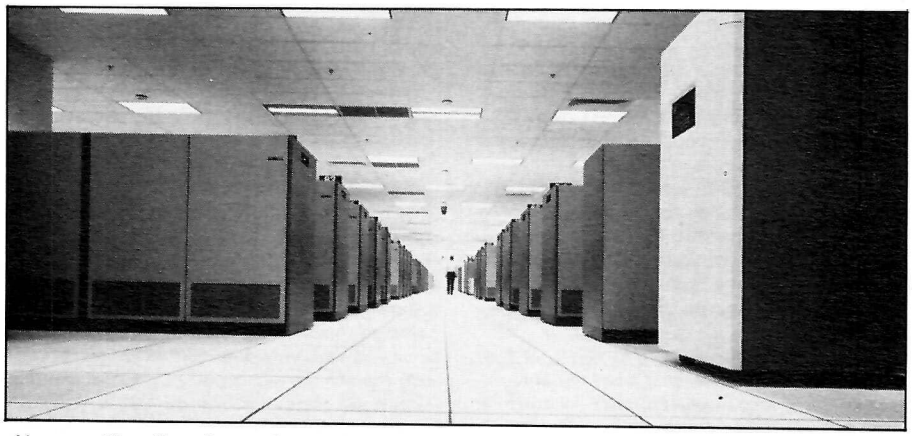
As the telephone system in the United States, unlike that in the UK, encouraged competition between manufacturers, the technology used has been in advance of that in the UK. Consequently, these electronic mail, information providing systems for the general public are more numerous and widespread than in the UK. It's fair to say, though, that the UK is catching up now.

Similar facilities are available free of rental or reception costs from a service generically known as teletext. Here, too, screens full of computer-generated information can be viewed quite easily on your domestic colour television set. The important difference between this and the Prestel type of Viewdata service is that Viewdata connects you directly with the service's computer by a physical link (telephone line) allowing two-way communication, but teletext is broadcast with your television programmes and so cannot support two-way communication. All you can do with teletext is receive the pages of information that the service operator chooses to broadcast. Of course, you do have the choice of which of those pages you view.



*Independent Television have their own teletext service called ORACLE. It, too, is broadcast with television programmes and requires a teletext receiver to decode the information. Here, news pages are continually updated throughout the day.* Photo: ORACLE.

*In the home, computers such as the humble Sinclair Spectrum can give you a taste of the home and office of the future. A message typed on one computer can be sent along a cable, perhaps a telephone line, to another computer – electronic mail.* Photo: Sinclair Research.



*Above and heading picture: Rows of huge grey boxes next to a room full of flickering screens. Called the mainframe, it occupied several rooms, consumed vast amounts of electrical power and needed a team of specialists to operate it. Now, powerful desk-top microcomputers have brought the processing power of the computer within the reach of almost everyone. This building houses 13 IBM computers at a cost of $130 million!* Photos Macdonald Douglas – St Louis.

### Political considerations

Not all of the information that the public could make use of is freely available. If you book your holiday through a travel agent, the agent will probably reserve your airline tickets, for instance, by tapping your details into a computer terminal linked directly with the airline's booking computer. If that service were to be extended to the general public, we might see the end of the travel agent as we know it now.

Banks, keen to offer the latest in the increasingly competitive High Street financial service market, are getting into new technology too. You can examine your bank balance, request bank statements and cheque books, transfer money between accounts, transfer money from your account to companies who subscribe to the system, etc all without leaving the comfort of your armchair. It's all done by videotext (the generic name for any system that distributes computer-generated information to television screens), using small computers to link up with larger bank computers by using, you guessed it, the telephone line.

### Work patterns

The combination of computers and communication means that not everyone need travel to a remote workplace to do their job now. If your job mainly involves using the telephone and a typewriter or computer to prepare figures or process paperwork, then there's now no reason why you should not do that at home and send the results of your labours to a central collection point. Lots of people already work in that way and it's on the increase. The implication is that the trend leading away from small cottage industries towards more centralised monolithic office networks is beginning to slow down and may reverse. It won't be possible to remove everyone to their home for work and not everyone would welcome the isolation from work-mates that home-working imposes. That change in work patterns and social organisation in the work-place is something of a revolution in itself.

Now, your living room can look something like the flight deck of the Space Shuttle, with flickering screens showing news and views, facts and figures, and personal messages from all round the world. The technology is shrinking the world and making much more information available to the private individual. Space links are beginning to become available, too. Surrey University has designed and built two satellites, which have been launched by NASA and whose computers will talk to you, describing the spacecraft status. Yachtsmen frequently use equipment which establishes their position by communicating with satellites. And more and more powerful communication satellites are being built and launched all the time with more spare capacity, which will ultimately benefit the consumer with his own data transmission/reception facilities.

The revolution continues. It's almost impossible to predict what the future will hold in this field of technology. Many futurologists ignore it altogether. Political and financial considerations are difficult enough to predict, but perhaps more important and most fickle of all is the question of which particular aspect of the forthcoming technology will be taken up and developed further at the expense of other routes of development.

NEW!
A UNIQUE CONCEPT IN SOLO ROLE-PLAYING ADVENTURE

# Time is running out...

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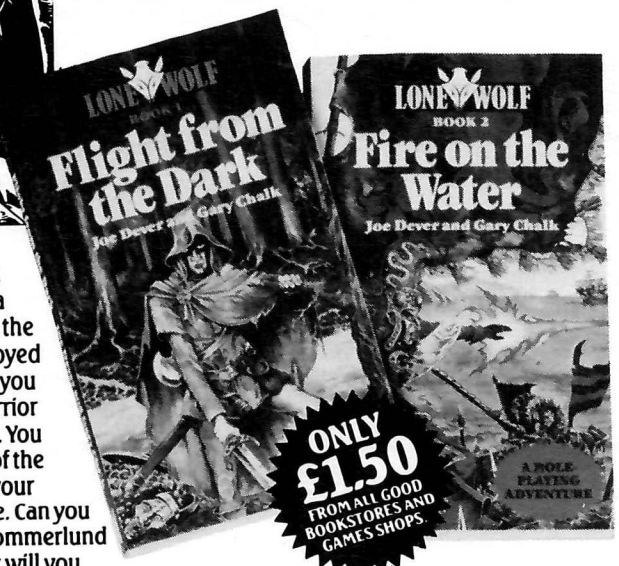


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**THE AUTHORS**
To regular readers of White Dwarf, the author/illustrator team of Joe Dever and Gary Chalk needs little introduction. Both are contributing editors to the magazine with their popular 'Tabletop Heroes' miniatures review feature. In 1982, Joe Dever won the Advanced Dungeons and Dragons ® Championships in Baltimore, USA, and he has appeared on TV, radio and in the national press in connection with fantasy role-playing games. Gary Chalk is the inventor of the acclaimed wargame, 'Cry Havoc', and illustrator of the current bestselling fantasy game, 'Talisman'.

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**SPARROW BOOKS** AN IMPRINT OF ARROW PUBLICATIONS

DENNIS LAWSON IS A SURVIVOR. AGAINST ALL THE ODDS, HE HAS APPEARED IN ALL THE STAR WARS FILMS TO DATE, PLAYING THE ONLY MINOR CHARACTER TO DO SO. DURING THEIR RECENT VISIT TO EUROPE, RANDY AND JEAN-MARC LOFFICIER INTERVIEWED HIM IN LONDON FOR *SPACE VOYAGER.*

# ALIAS

# WEDGE ANTILLES

The *Star Wars* universe is populated by many briefly seen faces, which all have one thing in common. By the end of the film, they will have been added to the list of victims of the Empire. There is an exception to every rule, and the character of Wedge Antilles is it.

The son of General Antilles, whose ship is destroyed in the very opening of *Star Wars,* Wedge is the only 'minor' character to have survived all three of George Lucas' films. His role, albeit a small one, has come to be symbolic of the survivor. No matter how often he does battle with the enemy, he always comes out alive. Dennis Lawson is the Scottish actor who has played Wedge since 1976. Well known in England for his work on stage and in television, he has come to be recognized in the United States, not only for his recurring role in *Star Wars,* but for a starring part in the recent film, *Local Hero.*

Sitting in the tea room of London's famed Savoy Hotel, Lawson spoke of his role as George Lucas' 'token survivor.'

**VOYAGER:** *Could you tell us about your background?*
**DENNIS LAWSON:** That'd take me a long, long time! I trained in Glasgow, Scotland as an actor and I moved to London in 1971 or 1972. After that, I started to do a bit of television, and I made my first film in 1976, with a French director, Alain Resnais. *Providence,* it was called. That year, I also did *The Man in the Iron Mask.*

Probably by biggest break in the theatre, was an American musical called *Pal Joey,* which ran here in London for a year. Obviously, *Local Hero* has also been a big break as far as work is concerned.

**V:** *How did you get asked to be Wedge in the first* Star Wars *film?*
**DL:** It was a kind of accident, really. Way back at the beginning, I went to see George when he first came to London for the first *Star Wars* picture. I met George months before they started, and he didn't ask me to do the picture at all. But, the actor whom he'd employed to play Wedge, didn't work out for some reason. So, I got this call from my agent, who said, 'Look. They're sending you a script for this film. Could you start on Monday?'

Then, of course, at the end of the first movie – I don't think it was deliberate – Wedge was left alive. I was very surprised when I watched the very first *Star Wars* picture, and I thought, 'Oh, that's me, I've been blown up.' Then I came back again. I didn't know what was happening really! It was really funny. There must have been about three people left alive, and he happened to be one of them! So, I became George's 'token survivor' in a sense.

**V:** *When you were left alive, did you think that you would be coming back for film number two?*
**DL:** No, I didn't really think about it. I don't think at the time that I really knew about the sequel, or the whole project. I was surprised the next time around.

I thought *Star Wars* would do well when I read the first script, because as a script it was a very nice script to read. It was like reading a very good adventury story, it was very accessible. So, I had a feeling it might do well, but I didn't anticipate just how well!

**V:** *When were you contacted to be in* The Empire Strikes Back?
**DL:** At the time I was doing a show called *Bits of Lenny Bruce* in the back of a pub in Islington, and they contacted me then. That entailed going to Norway for the snow stuff. So, I was snowbound in Norway for a couple of weeks.

When we got there – I don't know if you know this – we were 4000 feet up in the Norwegian mountains in a skiing lodge. There were no roads, there was only a railway, and it was minus 30 degrees. About 80 people live up there. We couldn't see anything outside the windows for three days. It was completely white out. A complete blizzard. We couldn't move, nothing was shot. In fact, I think that the reason they were there, was to shoot on a big glacier, and they never got to it because the weather was so bad. It was another couple of thousand feet up and, as far as I remember, you couldn't even get up there. It was the most extraordinary location, just amazing.

When the sun came out, it was just a breakthtakingly beautiful place. Stunning. It was an extraordinary kind of production exercise to get all of that set up. It was like an army camp.

It's rather presumptuous of me to say so, but I think it might have been a mistake to go to Norway for *The Empire Strikes Back.*

It's fairly well known in film circles that you can shoot snow better in the studio, than you can in real snow. Because the light is so difficult, you can actually control snow better in a studio. George Lucas might slap my wrist for that, but it seemed that was the case.

**V:** *Empire was the only film where you went on location, but that was an exception. Normally, what's the set-up?*
**DL:** It's like a dentist's chair, really. It's a rather comic atmosphere when you're doing these things, because there are around ten pilots hanging around, and up in the air, in their cockpit cutaways, with the camera in front of the seat. It's a bit like going to the dentist, really, you're all waiting to go.

The only thing that always surprised me in the first picture was that, when we were in the cockpit, we were up on a ramp. With all the technology all around, there were still eight guys standing on the ramp, moving it around! You'd think that they would have a special kind of compùterized thing that would give them the right kind of movement, but instead there was this bumbling around underneath it . . . I can't remember whether they were still there for *Jedi* or not. Maybe I just didn't notice!

It's quite hard to do. What you have to do, is shoot all of your lines without any cues, and pretty well out of sequence. It's a very technical exercise. You're doing, maybe a couple of dozen lines, spaced over about fifteen pages of script, without any cues. So, basically, most of the time you have to have your lines read to you off camera, then you repeat them.
**V:** *Are you shown a storyboard to guide you in your lines, so you know more or less what's happening?*
**DL:** No. they don't. Since the first film, they keep the story very much secret, so that you don't know what's happening at all. It was the same for *Return of the Jedi* as it was for *The Empire Strikes Back,* they just sent me a few pages.

It can be frustrating. It's not so bad for those characters such as Wedge, but for some of the main characters, it's harder. Because, they have secrets from each other. They have different pages that they don't show each other.

**V:** *When they hire you to play Wedge, you must do all of your scenes together?*
**DL:** Yes. It's pretty quick. It's done within a

***The Empire Strikes Back, Rebel pilot Wedge.*** **Photo: Lucasfilm**

fortnight. Or, I might do three or four days, and then come back a couple of weeks later, or something like that. You're talking about just a few days work. What happened was that, for both films, I was able to work around their schedules. Usually, they can give you quite a lot of leeway in terms of when you can come in to do it. Because, it's something they can pick up very easily.

**V:** *Do you actually get to interface with the other actors in the film, like Mark Hamill, Harrison Ford, etc?*
**DL:** Yes, certainly. When I was out in Norway, there was only really Mark and Harrison who were out there, apart from myself. The rest were extras. And, at the time, Mark and I were both expecting babies . . . we carried it really well! Of course, he's very slim hipped, that's what it is! Anyway, we became great friends out there. Our sons are both about the same age now. So, when he was over to do the next picture, we saw each other again. So, I meet them socially.

**V:** *Since most of your scenes are in your 'dentist's chair' I suppose you don't have much chance to act together?*
**DL:** Absolutely not. On the last picture, I walked around for the first time, and people could see that Wedge had a pair of legs! I met Billie Dee Williams, obviously. But, you tend to meet everybody along the way, actually.

**V:** *Considering all the technical things that are involved, does the shooting go smoothly?*
**DL:** I think it's fairly smooth now, when they do the pilot stuff. SInce the first movie, they know exactly how to set it up and how they want to cover it. But, once you go outside that, into the bigger scenes, it does get extremely complicated.

The biggest scene I was ever involved in, in my life, was the one in the snow hangar in *Empire*. That was just phenomenal. That sound stage was just huge. It was the size of two football pitches, there were hundreds and hundreds of people rushing about.

It is very hard, I think, for the actors – and I don't include myself in that for these movies – to get their performances across under such conditions. You're dealing with such high technology all the time. So, they really have to have their work cut out for them in the *Star Wars* films.

**V:** *As an actor, what do you feel about the fact that in many of these films, the actor takes a back seat to the technology?*
**DL:** I don't think it bothers me that much, but it is a fact of life, generally in these pictures, that you're acting against a backdrop of total high technology. A great deal of energy goes into that rather than into the human beings who walk around.

I'd have to say that, personally, the movies obviously aren't very challenging for me as an actor. I can't really speak for the leading actors in the pictures. So, my job in those pictures has always been a fairly technical one.

Although, I would say that it was a very, very valuable experience for me to do those pictures, because of those very technical problems. I'm very interested in film acting, very, and I'd like to do a lot more of feature films. It was very valuable to have to work that way, almost by numbers.

**V:** *After being in all three pictures, could you compare the styles of the three different directors?*
**DL:** Some of those directors worked better with actors than some of the others, but I can't really tell you who they were! They did have a different approach. As an actor, I can see it in the movies. I can see more rounded performances in some of the films . . .

**V:** *Have you given any thought to the character of Wedge? Where he comes from, etc.*
**DL:** No. I haven't. It's strange, because I get a terrific amount of mail from the movies, which really surprises me. I don't have any theories about the character, really. But, lots of people who write have, and they seem to know more about the thing than I do.

**V:** *How do you feel about those kinds of letters and the fans that get so involved in the lives of the characters?*
**DL:** I find it very surprising that people should get so involved. It's not surprising for children, for instance, but it's not just children who write to me. It's adults, and they seem to be totally engrossed in it. Especially, to write to me. Because, to tell the truth, my contribution to the *Star Wars* films is minimal. But I try to write back to all of them! I get quite a lot of mail anyway, and I think I'm about three months behind at the moment. But anybody that has written to me *will* get a reply. It's been a very busy year.

**V:** *What do you think of the Star Wars phenomenon in general?*
**DL:** Well, it's quite remarkable. I mean, George has created an extraordinary universe in his films. I think that's what fascinates people. I don't particularly find any great depth in the movies, but I think that what he draws, the kind of social structure that he created in these pictures, shows an extraordinary imagination. And, I could see people being caught up in that. Which they do seem to be. But, I don't know why it's *so* popular. I really don't.

**V:** *But when you go to see the films, do you go with a regular audience? And do you get caught up in that excitement as well?*
**DL:** Yes, I do go with a regular audience. But, no, I don't get caught up in the same way . . .

***Return of the Jedi. Han Solo congratulates Wedge, a Rebel pilot, during the victory celebration on the Moon of Endor.*** **Photo: Lucasfilm**

THE NIGHT SKY IS FULL OF STARS, ALL LOOKING MUCH THE SAME TO THE NOVICE OBSERVER. PATRICK MOORE OFFERS A FEW POINTERS TO HELP YOU FIND YOUR WAY ROUND THE CONSTELLATIONS

# CELESTIAL MAP READING

Look up into a starlit sky on a dark, clear night and you may have the impression that you are seeing millions of separate stars. In fact you aren't; only a few thousands, and learning your way around the star-groups or constellations is a great deal easier than most people believe. A few evenings' practice will work wonders, and the stars become so much more interesting when you learn which is which.

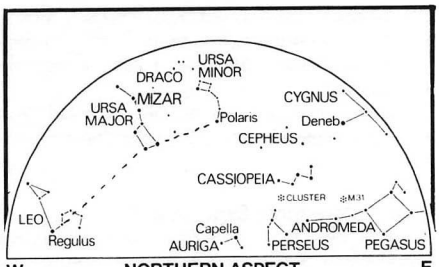
My own method – and I have found, over the years, that it works well – is to begin with a few groups which are so obvious that they cannot be missed, and use them as *guides* to the rest. Before long you will build up a good overall picture. And remember, the stars do not seem to move relative to each other (at least, not obviously; the constellations we see today are, to all intents and purposes, the same as those which must have been seen by King Canute, Julius Caesar or even Homer.) Of course the stars are suns and are not genuinely fixed in space; they are moving around in all sorts of directions at all sorts of speeds, but they are so far away that their individual or *proper* motions are negligible over many lifetimes. It is only our nearer neighbours, the members of the Solar System, which shift about from one constellation to another.

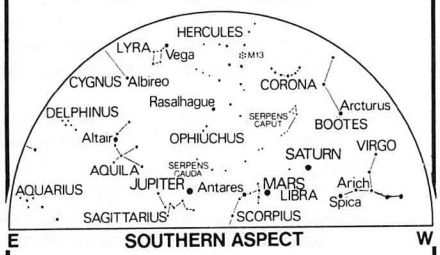
## Ploughing through the sky

To my mind, the two most useful *guides* are Orion and the Great Bear. Unfortunately Orion is out of view during the summer, because it is too near the Sun in the sky, so we are left with the Great Bear – Ursa Major, whose seven main stars make up the familiar pattern always nicknamed the Plough. During summer evenings the Plough is high in the north-west. It is so close to the north pole of the sky that it never sets over Britain and you can always find it somewhere or other whenever the sky is sufficiently clear and dark.

Look at the two *end* stars. These are known as the Pointers, because they indicate the direction of Polaris, the Pole Star, which is within a degree of the polar point and seems to remain almost motionless with the whole sky rotating around it once in 24 hours. If you have binoculars, look next at Mizar, the second star in the Plough *handle*. Even with the naked eye you will see that Mizar has a faint companion, which is known as Alcor; binoculars show the pair excellently. If you have a telescope, you will be able to see that Mizar itself is a double or binary pair, with one component decidedly brighter than the other. Binary systems are very common in the sky – they may indeed be commoner than single stars such as our Sun.

Next, look almost directly overhead. There you will see a very bright star, Vega in Lyra (the Lyre) which is quite unmistakable, partly because of its brilliance and partly because of its lovely blue colour. The blueness is evident with the naked eye, but even better seen with binoculars. Vega, incidentally, is over 50 times as powerful as our Sun – and recent studies indicate that it is associated with dark, cool material which may be a planetary system, perhaps a planetary system in the process of formation. In the same binocular field as Vega you will find a much fainter star, Epsilon Lyrae, which is another binary; the two components are almost equal in brightness and telescopes show that each is again double, making up a double-double or quadruple system.




***This is what you should see in the night sky if you go out of doors in the UK during July at about 21.00 GMT (10 pm, Summer Time). By the end of September, at the same time, Arcturus will be low in the west, with Cygnus almost overhead. Pegasus will have risen, while Leo will have disappeared.***

## Splitting binaries

High in the north-east you will find the constellation of Cygnus, of which Deneb is the brightest star (a true searchlight, at least 60 000 Sun-power even though it is so remote that it does not look so brilliant as Vega). Cygnus, the Swan, is often called the Northern Cross, and is indeed X-shaped. Albireo, the faintest of the stars in the cross, is a glorious double with a golden-yellow primary and a vivid blue companion. It is so wide and easy that good binoculars will split it. It lies roughly half-way between Vega and another bright star, Altair in Aquila (the Eagle), which is easily identified because it has a fainter star to either side of it.

Note also that the Milky Way runs through Cygnus and Aquila, down to the southern horizon – where you will also find the bright red star Antares in the Scorpion, which is so big that its huge globe could swallow up the entire path of the Earth round the Sun. Sweep along the Milky Way with binoculars and you will see almost endless rich star-fields. It is sobering to reflect that each of these tiny dots is a huge sun, possibly attended by a system of planets . . .

In the north-east, look for the Square of Pegasus. Leading away from it is a line of stars marking Andromeda. Here we find a hazy patch kown as Messier 31. It is a separate star-system or galaxy, far beyond our own; its distance is over 2 million light-years, so that when we look at it now we see it as it used to be more than two million years ago. Time-travel, à la Dr Who, is probably impossible; but we can do the next best thing – we can look backward in time. Moreover, Messier 31 is one of the very nearest of the outer galaxies. Binoculars show it easily, and on a clear night it is just visible with the naked eye.

## The celestial wanderers

What about the planets? Well, three of them are on view during evenings this summer. Jupiter, low in the south in the constellation of Sagittarius (the Archer) is much the brightest, and far outshines any star. Binoculars will show a definite disk, and you should also be able to make out the four bright moons or satellites. Mars, in the Scorpion, is now fading as it draws away from the Earth; Saturn, which looks like a rather undistinguished yellow star, is the gem of the sky – the wonderful ring-system is now wide open. Binoculars should show something unusual about its shape, but telescopes are needed to display the ring-system well. I recommend borrowing a telescope and taking a look at Saturn if you possibly can.

Finally, of course, there is the Moon, which is full on August 11, September 10 and October 9. Full moonlight tends to drown the stars, and in any case the best time to look at the Moon through binoculars is when it is crescent or half, because the craters and mountains then cast long shadows. And a last word – on no account look at the Sun direct through any telescope or pair of binoculars, even when a dark filter is used. Permanent damage to the observer's eye is almost certain. But even without bothering about the Sun, or even the Moon, there is plenty to see; the night skies are always changing, and they can never be dull.

NOTE: All interested amateur astronomers are recommended to join the British Astronomical Association. No positive qualifications are needed. Full details can be obtained from the Secretary, BAA, Burlington House, Piccadilly, London W1.

# Letter from Hollywood

RANDY AND JEAN-MARC LOFFICIER REPORT ON THE LATEST NEWS AND VIEWS FROM THE HUB OF THE FILM WORLD

One of this Summer's biggest films, at least in terms of budget, is *Ghostbusters,* a zany comedy directed by Ivan Reitman *(Heavy Metal).* With a cost of about $35 million, *Ghostbusters* stars *Saturday Night Live* alumni Dan Aykroyd and Bill Murray, as a team of wacko scientists who go into the ghost-hunting business. The lengthy and complicated special effects were handled by a new company, set up by former Lucasfilm technician Richard Edlund.

The film also stars beautiful Sigourney Weaver *(Alien)* as the resident of a New York apartment, on the top of which is located a doorway into another dimension. The film's climax involves a giant marshmallow monster, roaming through the streets of New York City.

### Space Ace

Speaking of doorways into other dimensions, Don Bluth Studios, which last year gave us the first heroic fantasy, interactive video game, *Dragon's Lair,* has again struck it rich with *Space Ace,* a new interactive game featuring battles between the Ace and the hordes of the intergalactic villain, Borf.

Featuring about 25 minutes of sophisticated animation, *Space Ace* contains giant, whirling droids with spinning armatures that can literally bore somebody to death; a carnivorous, alien plant with creeper vines; snorting Neanderthalic predators; dirt-bike riding 'Babaloons', and twenty other incredible monsters!

Bluth is now at work on *Dragon's Lair II,* a new epic which will take Dirk the Daring back through time!

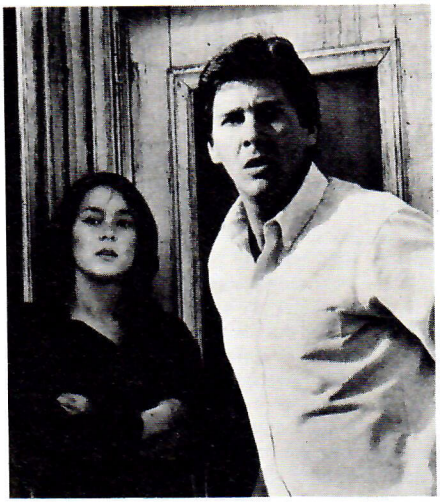
***Don Bluth brings the Space Ace game to the screen. Dragon's Lair II next.*** **Photo: © 1983 Don Bluth.**

### The Philadelphia Experiment

Time is also the subject of *The Philadelphia Experiment,* a film that has been around the Hollywood Studios for a while. The story starts in 1943 when, during an invisibility experiment conducted by the US Navy, four men disappear. They find themselves thrown forward in time to 1984 . . .

*The Philadelphia Experiment* started production years ago at Embassy Pictures under the directorship of Joe Dante (See *SPACE VOYAGER No 4*). The film is now produced by John Carpenter *(Escape from New York, The Thing),* for New World Pictures, and is directed by Stewart Raffill, whose most recent SF escapade was the spoof, *Ice Pirates.*

*The Philadelphia Experiment* stars Michael Pare *(Eddie and the Cruisers),* and long-time Brian De Palma actress, Nancy Allen. The spectacular special effects were created by Max Anderson, a refuge from the Blalack Studios, where he worked on *Wolfen, Altered States,* etc . . .



***Meg Tilly and Tim Matheson star in Impulse as a young couple trapped in a town whose inhabitants lose control of their criminal urges.*** **Photo: © 1984 ABC Motion Pictures Inc.**

### Other Impulses

De Palma is himself directing *Body Double,* which he describes as an 'erotic fantasy . . .' and which is already causing waves amongst feminists.

Tim Matheson of *National Lampoon's Vacation* and Meg Tilly of *Psycho II* star in *Impulse,* another fantasy about a once-peaceful farming community whose residents are suddenly unable to restrain their most secret passions and inhibitions . . . *Impulse* will be produced by Tim Zinnemann and directed by Graham Baker *(The Final Conflict)* for 20th Century Fox.

Peter Vincent Douglas, producer of *Something Wicked this Way Comes,* has scripted a contemporary remake of the classic Robert Wise film, *The Day The Earth Stood Still,* also for 20th Century Fox, which is going into SF in a big way. If the film is successful, the studio is already contemplating a sequel . . .

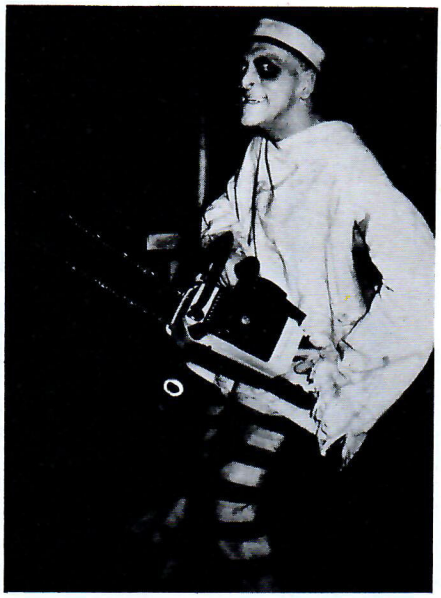
Speaking of sequels, George Romero has at last completed his screenplays for *Creepshow II* and *Day of the Dead,* which will start rolling in October. Not a sequel in terms of characters, the third film in the *Dead* Trilogy will nevertheless follow the 'zombie mythos' established in the two previous pictures.

Perhaps the most famous of all modern mythos, the *Star Wars* mythos, will soon take a new life. Rumours abound in Hollywood that produotion has started on George Lucas' *Star Wars IV,* sub-titled *The Clone Wars.* The big question now is, will Steven Spielberg direct?

Aaron Lipstadt's new film, *City Limits,* is now completed. Made by the same team that created the cult classic *Android, City Limits* takes place ten years after a plague has wiped out the world's adult population. The film pits the 'Clippers,' an indigenous urban population, against the 'Sunya Corp,' a youthful colonial force that wants to take over the Clippers' City.

Will *Voyage of the Rock Aliens* become tomorrow's cult film? It is a new SF spoof on everything from music videos to the SF films of the 50's. It features a guitar-shaped spaceship, and a bunch of crazy aliens. The film stars Ruth Gordon, Pia Zadora and Wes Craven's favourite star, Michael Berryman from *The Hills Have Eyes,* as Chainsaw, an escaped murderer.

***Above: Stunning special effects are the trade mark of The Philadelphia Experiment. Left: Walls have ears in The Philadelphia Experiment.*** **Photos: © 1983 Columbia Pictures Industries Inc.**
***Below: Michael Berryman is Chainsaw, an escaped murderer, whose got his work cut out for him in Voyage of the Rock Aliens, a musical fantasy adventure.***



# BUILD A HIST

IAN GRAHAM BUILDS THE NIKE AJAX MISSILE AND LAUNCHER FROM REVELL'S HISTORY MAKERS SERIES II

In Greek mythology, Nike was the winged goddess of victory and Ajax was a hero of the Trojan War. In military circles, Nike Ajax has another connotation – it is the name of America's first operational Surface-to-Air Missile (SAM). Dating back to the early 1950s, the Nike Ajax was a two-stage missile, which could travel 25 miles at two and a half times the speed of sound and destroy a target at up to 60 000 feet. Together with the Hawk surface-to-air missile, it replaced 90 mm and 120 mm anti-aircraft guns. The Hawk was necessary to bring down targets flying too low for the high altitude Ajax. By the late 1950s and 1960s, 16 000 of the Ajax had been delivered to the American army's 40 battalions and supplied to several European and Far Eastern countries.

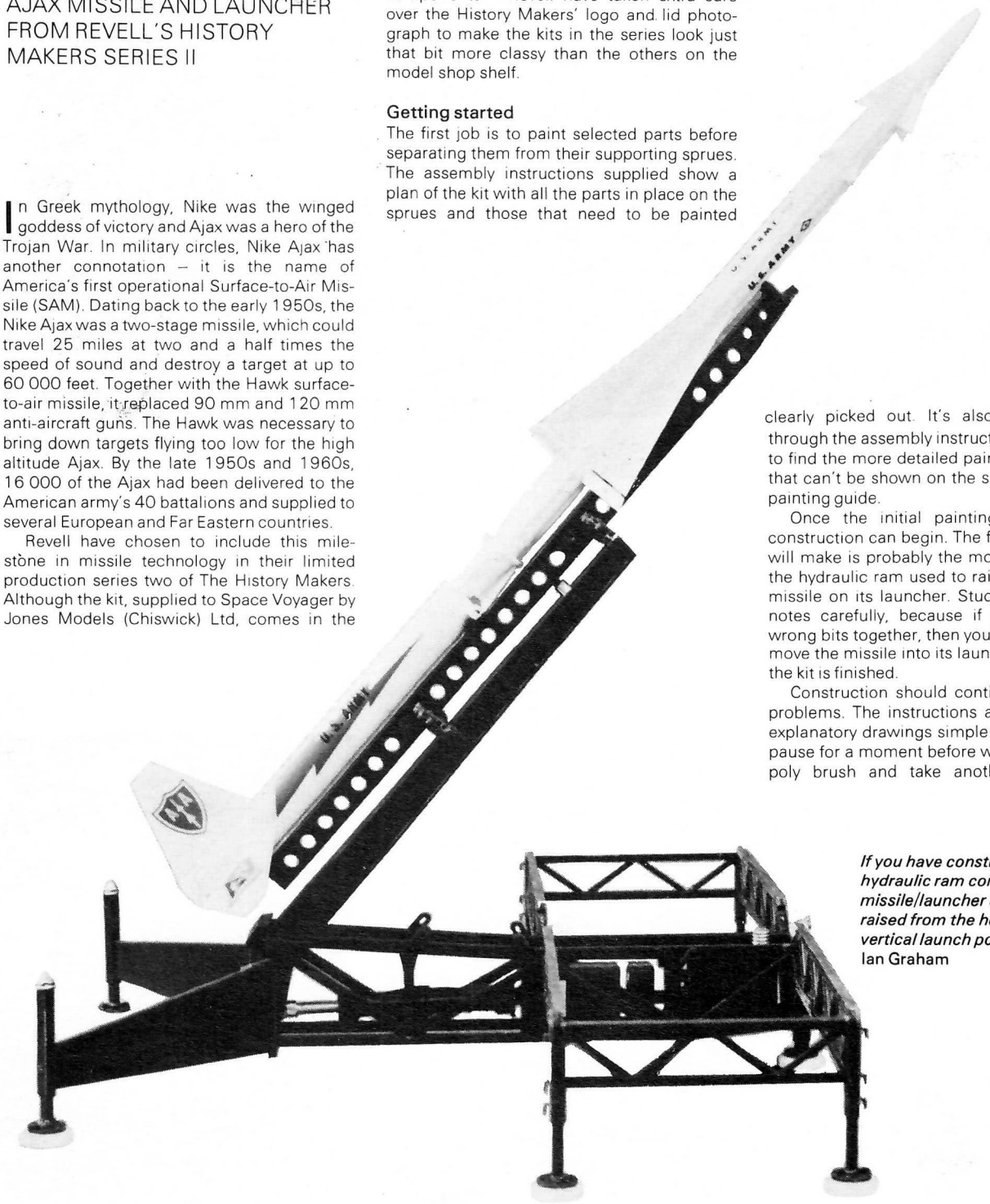
Revell have chosen to include this milestone in missile technology in their limited production series two of The History Makers. Although the kit, supplied to Space Voyager by Jones Models (Chiswick) Ltd, comes in the usual format – a cardboard box full of plastic components – Revell have taken extra care over the History Makers' logo and lid photograph to make the kits in the series look just that bit more classy than the others on the model shop shelf.

### Getting started

The first job is to paint selected parts before separating them from their supporting sprues. The assembly instructions supplied show a plan of the kit with all the parts in place on the sprues and those that need to be painted clearly picked out. It's also worth looking through the assembly instructions at this stage to find the more detailed painting instructions that can't be shown on the small introductory painting guide.

Once the initial painting is completed, construction can begin. The first item that you will make is probably the most important. It's the hydraulic ram used to raise and lower the missile on its launcher. Study the cementing notes carefully, because if you cement the wrong bits together, then you will be unable to move the missile into its launch position when the kit is finished.

Construction should continue without any problems. The instructions are clear and the explanatory drawings simple to follow. But do pause for a moment before wielding the liquid poly brush and take another look at the




***If you have constructed the hydraulic ram correctly, the missile/launcher assembly can be raised from the horizontal to vertical launch position.*** Photos: Ian Graham

# 'ORY MAKER

cementing notes at the bottom of each diagram.

### Oops!

When you are assembling the side support structures, remember that they're not all exactly the same. One of the side fences carries a post on which you will later mount a siren horn. This must be mounted in the correct position, the right way round, with the post facing frontwards. If you should get it wrong, don't despair. The siren can be mounted quite easily on the flat front of the front left support and the wrongly positioned post for the siren can be clipped off with a pair of scissors and filed flat (as I found out!).

The slim missile body contains a simple system for making opposite control surfaces move in unison. Two such systems are used, one in each end of the missile's second stage. Make sure you have identified the components for each system correctly and that you're clear about their positioning and operation before applying cement.

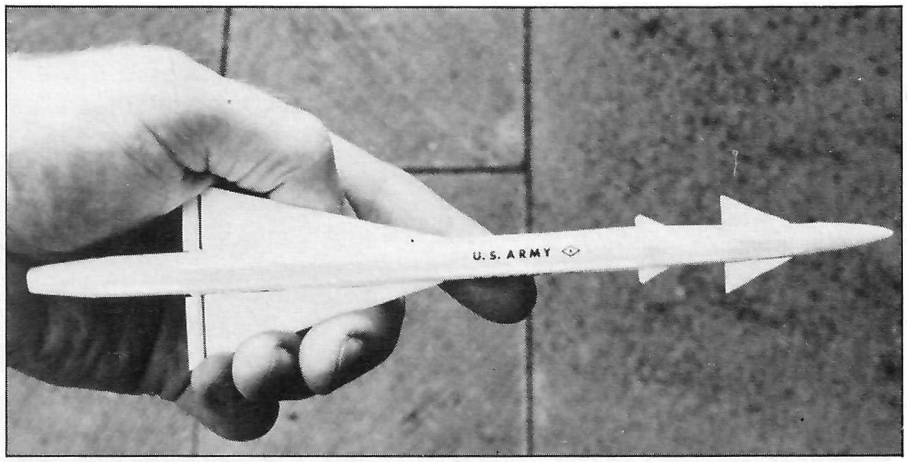
The control surfaces aren't a perfect fit for the side of the missile, so if you don't require the movable ones to move, you could cement both the movable and fixed surfaces in place and apply filler to improve the fit with the missile fuselage.

### Final touches

When the construction is complete, painted surfaces can be touched up if necessary and decals applied. There are four shields for the visible tail fin surfaces and four 'US Army decals for the second (front or uppermost) stage of the missile. The two US Army red lightning flashes are applied to the first (rear or lower) stage.

If you've constructed the hydraulic ram properly, you should now be able to mount the two stages of the missile on its launcher rail and raise the launcher from the transport to the launch position.

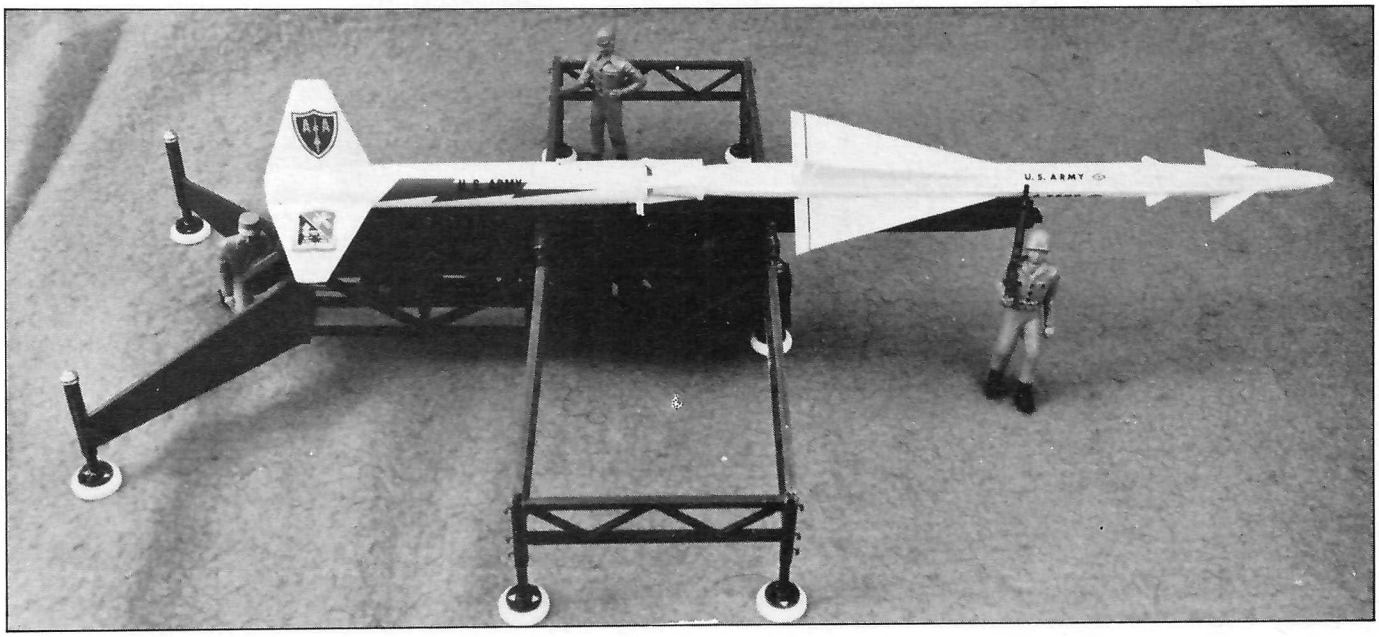
Revell supply three scale figures with the kit. These can be painted very simply, or, if you prefer, their rather rough casting can be modified to make them a litle more realistic and painted in greater detail.




*The business end of the missile. The second stage carries the moveable control surfaces which require some care in construction.* Photo: Ian Graham

The author would like to thank Jones Models (Chiswick) Ltd for supplying this kit.

*The finished model complete with the three figures.* Photo: Ian Graham



# EXPLORING

THOUSANDS OF SMALL DARK WORLDS, THE ASTEROIDS, ORBIT THE SUN WITH US. THEY RECORD THE EARLY DEVELOPMENT OF OUR SOLAR SYSTEM. AS WE MOVE TOWARDS THE INDUSTRIALISATION OF SPACE, INTEREST IN THESE MINERAL RICH ROCKS IS ON THE INCREASE. DR J K DAVIES OF LEICESTER UNIVERSITY INVESTIGATES THEIR ACADEMIC AND INDUSTRIAL VALUE

*Until the first asteroid flypast, astronomers will need to use large telescopes to study these tiny objects. This is the UK Infra-Red Telescope (UKIRT) in Hawaii.* Photo: Royal Observatory, Edinburgh.

# ASTEROIDS

Imagine a flash in the sky, 65 million years ago, a huge fireball as bright as the Sun blazing across the heavens. Seconds later a huge concussion from the sonic bang of the fireball followed by a tremendous explosion as the meteor strikes the ground and is brought to rest by the Earth's surface. The explosion, equal to about 100 000 megatons of TNT blasts a huge crater 20 kilometers in diameter and hurls thousands of tons of pulverised rock into the atmosphere, reducing the amount of sunlight received by the Earth's surface and causing drastic changes in the Earth's biosphere. At ground level, plant life is decimated, and deprived of adequate food, the hundred million year reign of the dinosaurs draws to an end.

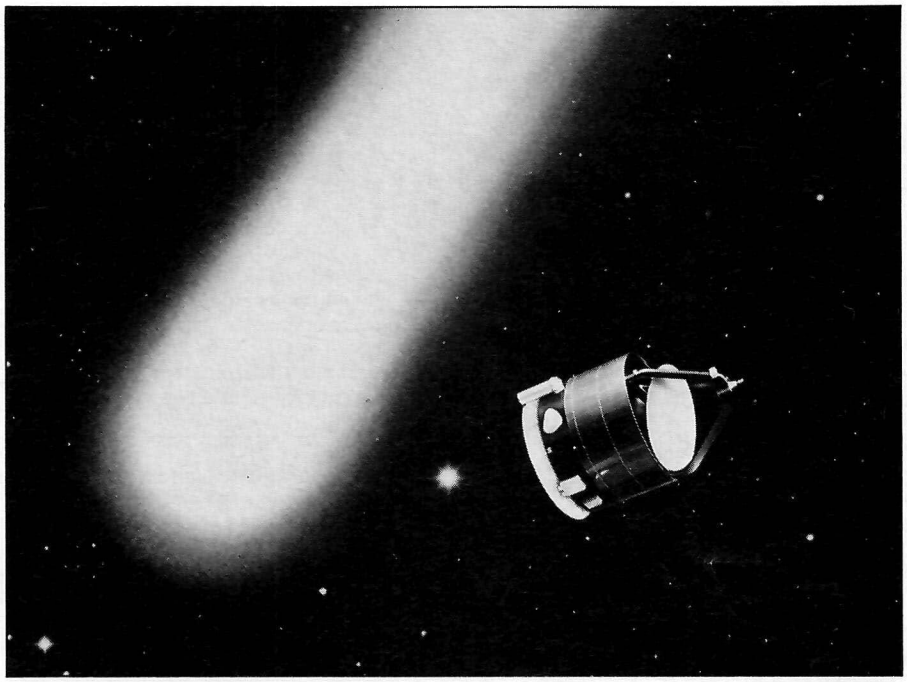
Could such a cosmic catastrophe have resulted in the extinction of the dinosaurs? The evidence is confused, and many paleontologists reject the idea, but one thing is beyond doubt: the Earth has been struck by large interplanetary objects in the past, and will be again!

Within the last 20 years, unmanned spacecraft have flown deep into the solar system and returned close up photographs of the planets and their moons. These missions have shown that craters are widespread throughout the solar system. Most of these were formed about four thousand million years ago during the final stage of planetary formation as the last of the orbiting proto-planets were swept up in a process called accretion. The Earth, too, was struck repeatedly in the distant past, but erosion and geological processes have long since healed the scars of these ancient impacts.

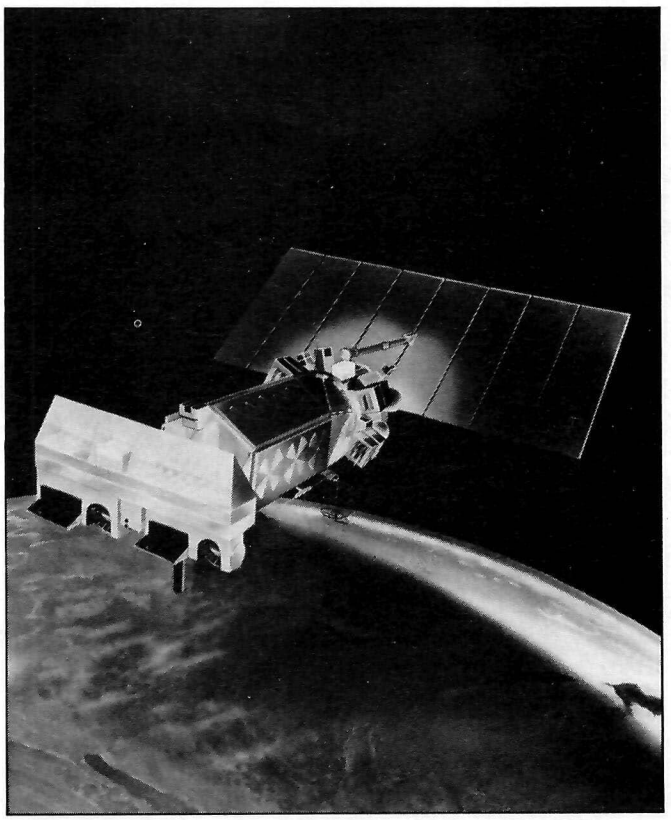
Scientists using photographs from aircraft and spacecraft have found the remains of about 100 eroded craters on the Earth. By counting the numbers and sizes of these craters and comparing them to the craters on other planets it is possible to calculate the rate of crater formation on the Earth. This shows that the Earth is struck by an object larger than one kilometer in diameter, and weighing over 100 million tons, about four times every million years. Fortunately, no such event has occurred in recorded human history, but, of course, no one can predict exactly when the next one is due.

### Cometary cores

What is the nature of this cosmic debris which is falling on to the Earth? A few of the objects are the cores of comets whose orbits happen to intercept that of the Earth. On June 30th 1908, in the region north of Lake Baikal and the Russian City of Irkutsk, there was a massive explosion which flattened huge areas of forest and was heard thousands of kilometers away. This explosion, referred to as the Tunguska



*The European Giotto spacecraft approaching Halley's comet. Comets may evolve into Apollo asteroids as all their frozen gas is boiled away.* Photo: ESA.



*A TIROS satellite in Earth orbit. Proposals have been made to modify such spacecraft for asteroid rendezvous missions.*

event because it occurred near the Podkammenaya Tunguska river, is believed to have been caused when a fragment from a comet collided with the Earth. No pieces of the object were ever found, presumably because comets are composed of frozen gases and ice which would have been completely evaporated by the explosion.

By far the largest number of craters on the Earth are formed by the impact of rocky bodies orbiting around the Sun. Craters formed by these objects are usually surrounded by meteorites, pieces which survived the explosion, or broke off during entry and landed close to the main crater. One of the best known meteor craters on Earth is the Barrington crater in Arizona (*Space Voyager* Feb/Mar 1984). These rocky mini-planets are usually called asteroids.

Most of the asteroids orbit the Sun in a broad belt between Mars and Jupiter. The first, Ceres, was discovered on January 1st 1801 by an Italian astronomer called Piazzia. Ceres is over 1000 km in diameter and can be seen easily with binoculars. Within a few years three other largish asteroids were discovered and named Pallas, Juno and Vesta.

Over the years, more and more asteroids were discovered, especially once astronomical photography was developed, and today over 3000 with accurately determined orbits are known and new ones are constantly being discovered. Not all of the asteroids are found in the main belt. One class, called Trojan asteroids share Jupiter's orbit at special stable points ahead and behind the planet. A small number of others, for example the unusual object Chiron, are found beyond the orbit of Saturn. Of special interest are a group of asteroids whose orbits sweep in from the main belt to cross the orbit of the Earth before circling the Sun and continuing back out beyond Mars.

### Tracking Apollo

The first of these Earth approaching asteroids was discovered by Karl Reinmuth of Heidelburg University in 1932 while searching for normal, mainbelt, asteroids. The object was followed for 3 months and then disappeared into the daytime sky. It was named Apollo, after the god of the Sun, and was not seen again until it was rediscovered by Harvard astronomers in 1973. Another object, in an orbit which did not quite cross the Earth, had been discovered a few weeks earlier and was named Amor, and a third, Adonis, was found in 1936. Like Apollo, Adonis was immediately lost and remained so for 40 years. The very next year a fourth object, about a kilometer across, flashed within 800 000 km of the Earth, was named Hermes, and has never been seen again.

Today, over 50 of these objects are known, and are grouped together as Apollo-Amor asteroids, or simply Apollos. Until the early seventies, very little attention was paid to them, but more recently special programmes have been set up to search for new ones and several are discovered each year. At the Mount Palomar observatory in California, astronomers regularly take photographs of the sky with a wide field telescope and examine them for evidence of new asteroids. If one is found, several more photographs are taken so the object can be tracked and its orbit calculated. Once the orbit is known well enough for future appearances to be predicted accurately the asteroid is given a number and a name.

### Electronic asteroid stores

The advent of new technology is promising to speed up the discovery of new Apollo objects. An organisation called Spacewatch has been set up as a joint project between NASA, the University of Arizona and private donors to develop new techniques for discovering Apollo asteroids. Spacewatch will scan the sky using a telescope with a charge coupled device (CCD) instead of a photographic plate. This will allow the telescope to be used like a very sensitive television camera which will store images electronically. Computer programs will compare images taken on successive nights and electronically cancel out the fixed, background stars leaving the traces of the Apollo asteroids on a TV screen or printout. The computer will also be able to measure the positions of the objects and begin the process of orbit calculation.

Spacewatch is already testing its special CCD cameras and computer software and has arranged to start observations using a 36 inch telescope belonging to the Steward Observatory on Kitt Peak in the USA. If sufficient money can be found, it is hoped that by 1986 Spacewatch will be in regular operation with a 72 inch telescope. With the new technology objects as small as 30 metres (100 ft) should be detectable leading to a flood of new discoveries.

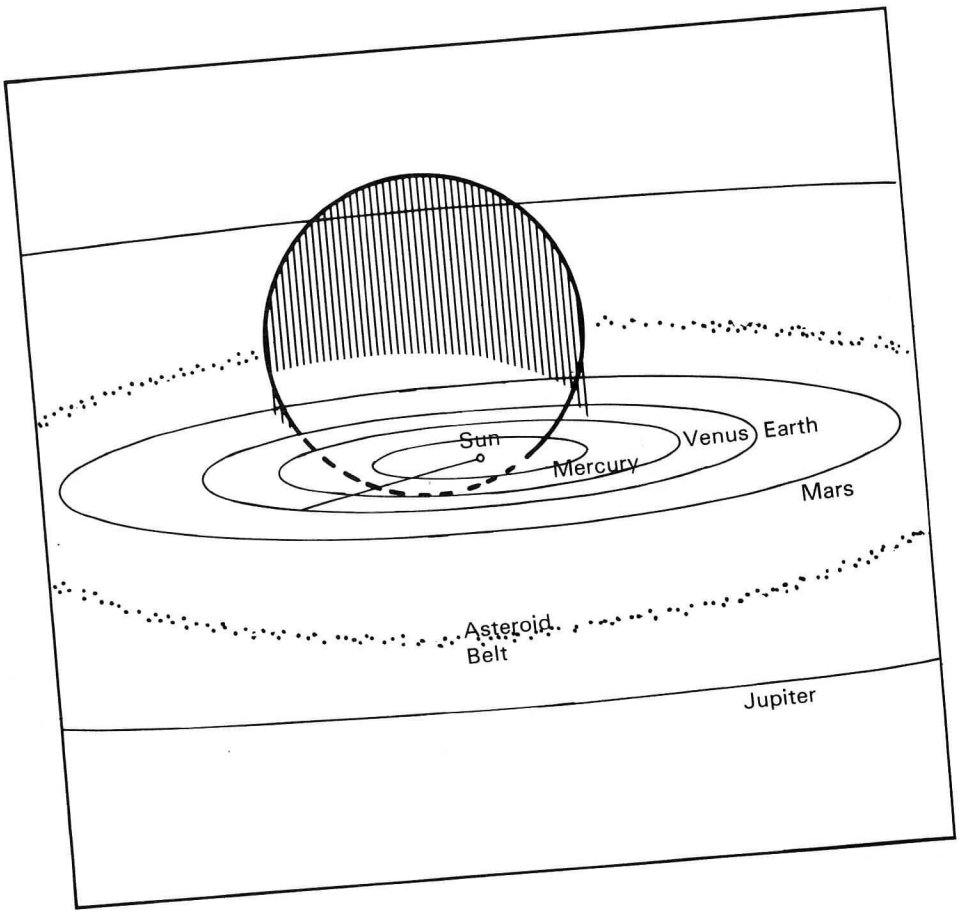
Most Apollo asteroids are only a few kilometers in size and even when they come close to the Earth no detail can be seen on their surfaces. However, astronomers using ground based telescopes and even radar are able to study the Apollos and have learned a great deal.

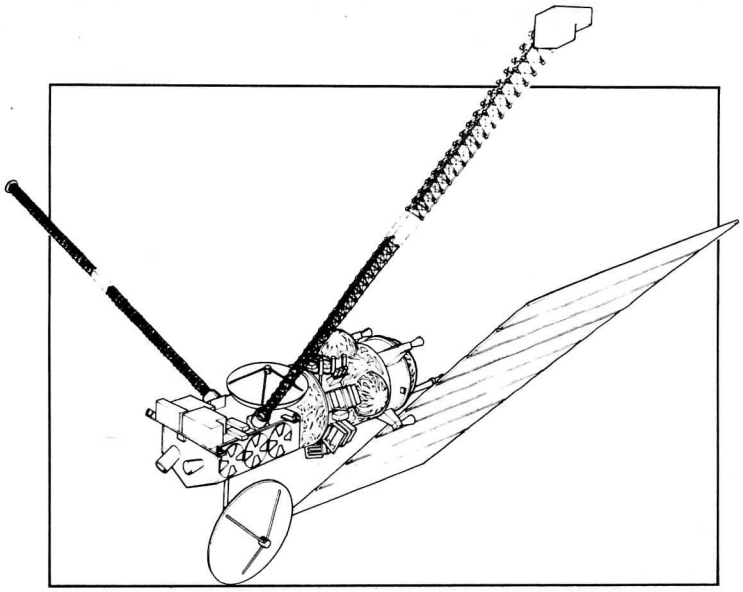
Asteroids shine by reflecting sunlight and by measuring how much light and of what colour, is reflected, much can be learned about the surface of the asteroid, including its chemical composition and whether it is covered by bare rock, or by dust. The brightness of Apollo asteroids varies regularly over a period of a few hours which shows that they must be unusual shapes which present different areas towards the Earth as they rotate.

### Asteroid fly-by

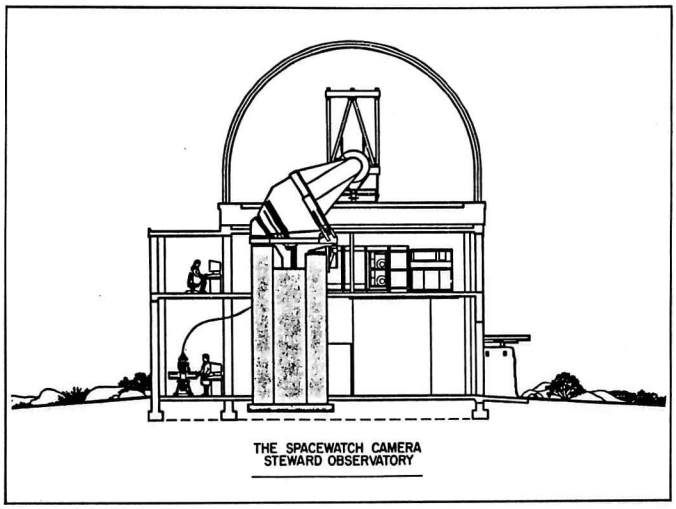
Despite the powerful methods employed by astronomers, much about the Apollo asteroids remains to be discovered and the next dramatic advance in asteroid science will probably come when the first space probe flies past one of these unusual objects. Although no asteroid mission is yet approved, several

*The orbit of Apollo asteroid 1983TB. The asteroid was discovered by Simon Green and John Davies (the author of this article) on October 11th in the course of the Leicester University search for fast moving objects in the IRAS survey data. The asteroid may prove to be very interesting since its orbit is very similar to that of the Geminid meteors. Meteor streams are usually associated with comets which may indicate that 1983TB is in fact a decayed cometary nucleus. Note that at 13 million miles 1983TB passes closer to the Sun than any other known asteroid.*
**Drawing: Leicester University.**





*A TIROS satellite modified for an asteroid rendezvous mission. Note the addition of a dish antenna for communication with Earth.* Photo: RCA.




*The Spacewatch camera, a computer controlled telescope to search for Apollo asteroids.* Photo: Spacewatch.

possible projects are under study and a go-ahead for one may be announced soon. A space mission to an Apollo asteroid has been given a high priority by NASA for two reasons: firstly, the asteroids can give vital clues to the early history of the solar system and, secondly, the Earth approaching asteroids may be an important new source of resources in the next century.

Astronomers want to know where the Apollo asteroids come from. Since they regularly strike the Earth and other inner planets the original population of Apollos must have disappeared in the four and a half thousand million years since the solar system was formed. To replace these, new objects must have been moved into Apollo type orbits. Most asteroid scientists believe that they are main belt asteroids somehow moved into new orbits by gravitational forces; others believe that the Apollos are inactive comet nuclei from which all the gas and dust has boiled away. An asteroid mission will help to resolve this question.

Asteroids are important for another reason: they are small, inactive and have no atmospheres. This means that, unlike the Earth and other planets, they have not been altered by weathering or geological activity. So when scientists are able to examine an asteroid in detail they will be looking at some of the original material which went to make the planets and has been preserved in space for billions of years. Once the composition of the asteroids is better understood, plans for their exploitation in the next century will be able to advance, but first some exploratory missions will be required.

### Low cost rendezvous

Fortunately, several Apollo asteroids have orbits which bring them close to Earth and so make them easy to reach using existing technology. Indeed, in energy terms, some of the asteroids are easier to reach than the Moon. In line with the new NASA philosophy of trying to reduce the cost of space missions, proposals have been made to modify existing Earth satellites for an asteroid rendezvous.

This exciting possibility is opened up because the asteroid rendezvous mission takes place at about the same distance from the Sun as the Earth. This means that solar panels, cooling systems and other housekeeping equipment used for Earth orbiting satellites can be used for the rendezvous spacecraft. The only major changes required are in the communication systems, attitude control sensors and scientific instruments. As an example, consider a spacecraft based on the TIROS-N weather satellite.

The modified TIROS is carried into orbit by a space shuttle and boosted towards the target asteroid by an inertial upper stage, a procedure which is already becoming routine. Once on course, the spacecraft separates from the booster stage, deploys its solar arrays and begins the cruise towards the asteroid. Depending on the target asteroid, the cruise phase may last from three months to a year, with occasional mid-course corrections.

Once the spacecraft arrives at the asteroid, the on-board propulsion system is used to match velocities so the probe flies in formation with the asteroid, but at a safe distance. Gradually the spacecraft closes in, using its TV cameras to accurately map the asteroid and determine its rotation period. Next the probe can make several close flypasts of the asteroid before finally moving into orbit around it. The tiny gravitational field of the asteroid means that very little fuel is needed for these manoeuvres, and allows the final dramatic phase of the mission.

After detailed studies from orbit lasting several months, the asteroid probe is de-orbited and allowed to fall towards the surface. Then, using thrusters, the spacecraft is brought to a halt above the surface for more measurements. It would then free fall towards the asteroid before once more jetting to a stop. This, interrupted free fall would continue with the scientific instruments getting a closer and closer view until the probe reached the surface. Finally, it is likely that a landing would be attempted, although since no landing gear will be fitted it would really be a quasi controlled crash, carried out to develop techniques required for future soft landing missions.

### Sample return missions

Future unmanned missions would probably include an attempt to return a sample of asteroid material to Earth for analysis. The Soviet Union has already returned lunar samples using Luna 16 and Luna 20 spacecraft, so no real technological difficulties stand in the way of such a project. Studies have already been made of sample return missions to the asteroids. One proposal is for a launch from a space shuttle in 1992 on a three year round trip to the Apollo asteroid Anteros. This mission would return a 1 kilogram sample of asteroid material to the Earth's surface. Other studies have shown that the energies required to reach the main belt are several times higher than for missions to the Earth crossing asteroids, so Apollo asteroids will probably be the first targets.

Once several Apollo asteroids have been investigated by unmanned spacecraft the time will be ripe to mount the first manned mission into deep space. Within the next decade NASA expects to have established a permanently manned space station and development of the long awaited Space Tug for shuttling between high and low Earth orbit will be under way. By combining these technologies, it should be relatively easy to develop a manned asteroid rendezvous spacecraft. In addition to conventional chemical rockets the asteroid probe could be equipped with ionic thrusters to speed up the interplanetary cruise portion of the mission. The asteroid mission would thus be the first step in extending the Space Transportation System to allow the exploration of deep space, another giant leap along the road to the planets.

The manned mission profile would be similar to that of the precursor probes, a launch from Earth orbit followed by a cruise phase and then insertion into orbit around the target asteroid. Depending on the results of measurements from orbit the spacecraft could then be landed on the asteroid, although, due to the low gravitational attraction the *landing* would be more like a docking between two spacecraft. Another possibility would be to remain in orbit and for the exploration team to fly down to the asteroid surface using de-

veloped versions of the Manned Manoeuvring Unit. The low escape velocity of the asteroid makes such a plan quite feasible. Indeed, the exploration team may need to string a cat's cradle of handrails to prevent them floating off into space when they indulge in any physical activity.

The survey team would cover the asteroid, taking samples and positioning automatic scientific stations similar to those left by Apollo crews on the Moon. Of special interest would be impact craters which would allow the subsurface detail of the asteroid to be studied. The craters are also of interest because material blasted off the asteroid may have been injected into orbits which coincide with the Earth at some point, allowing the fragments to fall as meteorites. This link between meteorites and asteroids is important because the chemical history of meteorites has received a great deal of attention in laboratory studies, and provided much information on conditions in the early solar system. Asteroid samples returned to Earth would receive similar detailed study.

### Asteroid mines

As humanity expands into space the asteroids will assume a new significance as a source of raw materials. In his pioneering work on space habitats, Professor O'Neill has shown that less energy is needed to move lunar material to Earth orbit than to launch a similar quantity of material from Earth itself. Even less energy per kilogram is required to actually relocate an Apollo asteroid in Earth orbit, where it could be mined, or dismantled, on the spot.

Such a mission would be comparatively easy with 21st century technology and we can foresee the operations that would be required. Firstly a candidate would be chosen from the hundreds of asteroids discovered by Spacewatch and its successors. Observations from ground based and orbiting telescopes would confirm that the asteroid contained the minerals of interest. This would be followed by an unmanned probe to accurately map the asteroid and determine its mass. Once a landing site had been chosen a manned mission would be launched to rendezvous with the asteroid and set up a solar powered electromagnetic mass driver.

The mass driver, or electromagnetic gun, was proposed by O'Neill as a means of launching material from the Moon's surface to Space Colonies in Earth orbit, but it can also be used as a propulsion system to modify an asteroid's orbit. The mass driver uses a long track down which buckets containing asteroid material are accelerated by a linear induction motor. Each bucket contains super-conducting coils which allow it to be supported by magnetic levitation, so there is no friction between the bucket and the track, and on an airless asteroid there is no atmospheric drag. Once the bucket reaches escape velocity it is decellerated, allowing the contents to shoot off into space. The bucket then returns to the starting point to be refilled before being reused. The constant stream of material being thrown off the asteroid acts like a rocket accelerating the asteroid in the opposite direction.

The mass driver is very efficient, converting almost 100% of the electrical energy into kinetic energy of ejected material and uses the abundant solar energy available free of charge for power. The propellant material from the asteroid itself is also free.

Once the mass driver was ready the asteroid would be nudged slowly into a path which would allow it to be captured into Earth orbit. Once the asteroid was stabilised in Earth orbit the crew would dismantle the mass driver and leave the asteroid for mining engineers who would exploit the newly delivered material. Clearly, such a project requires several new technologies such as more powerful space shuttles, space tugs and mass drivers, but none of them are beyond the reach of 21st century engineering.

### Hollowing out habitats

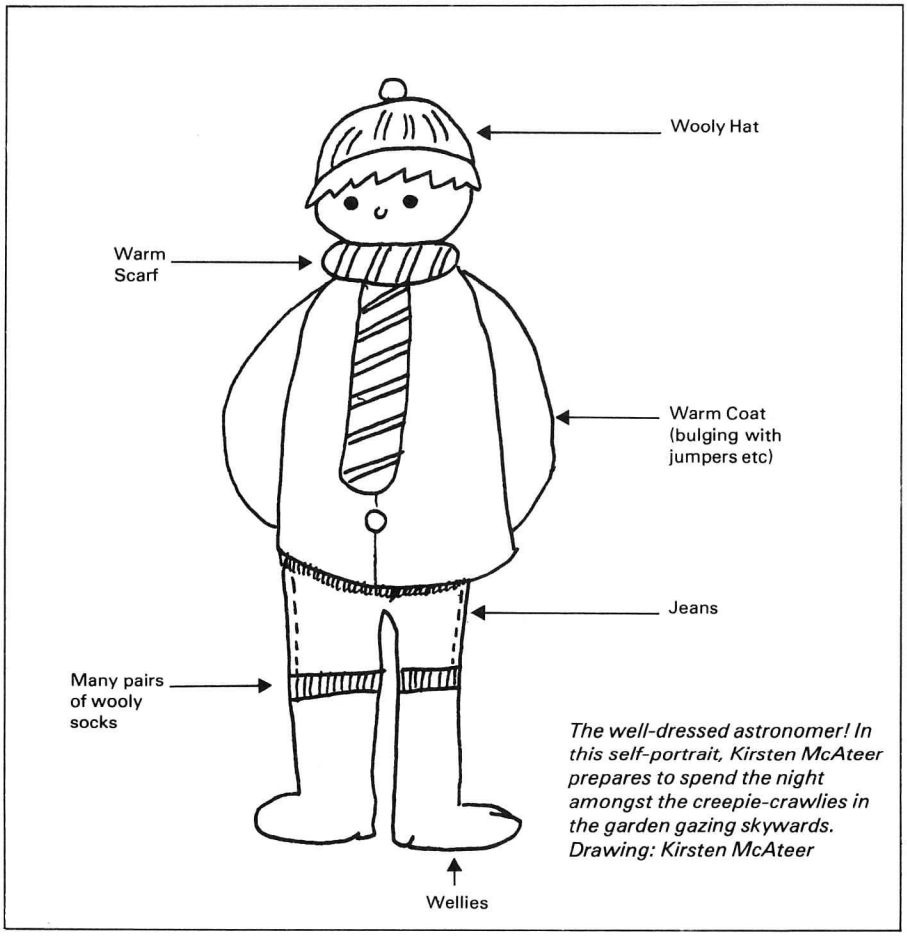
Once all the useful minerals have been removed from the asteroid it may be convenient to return it to solar orbit by the same method, or to use it for more dramatic purposes. One common theme is to hollow it out and use it either as a space habitat, or even as a starship, but such ideas are rather far in the future. A less distant possibility might be to crash the asteroid on to the moon. The impact of a body of known mass could be detected by instruments scattered all over the Moon, leading to a better understanding of the interior structure. The new crater would excavate material from below the surface which could be located using before and after photographs of the impact site and used for geological studies. Investigation of the new crater would help unravel the factors which define crater shape and size, both on the Moon and other planets.

It might even be possible to crash the asteroids on to the Earth to accomplish major engineering tasks such as re-directing rivers, or digging new canals. Such proposals have been made by serious scientists, although the technical difficulties pale beside the political problems which might arise. Imagine the scene: a flash in the sky, followed by a huge concussion . . . oh! well, this is where we came in!

*The Mariner Mark II spacecraft will be used by NASA for asteroid and comet missions in the 1990s.* **Photo: JPL**

# TROUBLE FREE ASTRONOMY

CAREFUL PREPARATIONS ARE VITAL BEFORE SALLYING FORTH TO MAKE YOUR OWN ASTRONOMICAL OBSERVATIONS. KIRSTEN McATEER EXPLAINS THE WHYS AND WHEREFORES




*The well-dressed astronomer! In this self-portrait, Kirsten McAteer prepares to spend the night amongst the creepie-crawlies in the garden gazing skywards. Drawing: Kirsten McAteer*

You need lots of warm clothes, patience and determination, when you decide to join the ranks of astronomers. First, lay your hands on as many books on astronomy as you can. Usually your local library will be the best source. A star chart is useful but if you can not afford one, trace one from a book or borrow one from a friend. Going back to the books, you need to read and swot up as much as you can. Do this before you even go out and start observing; a cold night in your back garden is no time to find out you don't know the difference between a star and a planet.

As for a telescope, the cheaper ones are no good for astronomy and you would be better off spending your money on a good pair of binoculars. They are cheaper, easier to hold and will give you very good results. And if later on you decide astronomy is not for you, you could always take up bird watching or wildlife stalking. Next you need a pad and pen on a clip board (you can make one of these from a piece of card and a clipper you can buy cheaply from a newsagents), a torch and a watch. When you do go out star gazing you can write down what you see, the time you see it and you can see what you're writing. Remember to cover the torch light with translucent red paper to dim the light beam; you'll be able to see the stars better. Another asset for seeing stars is total darkness. If you live in a town the light from the street lamps and the smokey atmosphere might make star gazing difficult, so it might be worth your while going into the country.

Now you're just about ready to begin. Put on all the wooly jumpers, thermal vests, long johns, etc you possess, because it can get unbelievably cold at night. Gather together your pen, paper, clipboard, torch and star maps and wait for it to get dark. It helps if it's a clear night; if it's cloudy you won't see anything or very little. If you plan to spend a little time outside and your neck is starting to hurt from all that looking up, a deck chair or sunlounger is useful. You can lie back and looking up is easier, even if the neighbours think you're a bit mad.

### Safety first

Sometime during the day, go into your garden and make sure all garden gnomes, plant pots, etc are out of the way. You could get a nasty surprise at night if you fall over them and the stars you'll be seeing won't be of the celestial variety. If you're planning to go out of town, visit the area during the day first and note any important aspects of physical geography such as sheer cliffs and marsh. If there is any water near you take extra care – cover any garden ponds if you can. There's nothing worse for the chest than a late night ducking.

Now, providing my advice hasn't put you off, you're ready to begin. Take your star chart outside and start by trying to recognise a few constellations. By learning the position of a few easy ones, the rest will be quite easy to find. As a matter of interest, the Daily Telegraph publish a monthly star map usually on the last day of the previous month. It shows the stars visible during the month, the position of the planets and any objects of special interest visible. And don't forget to note down what you see so you can compare your own results. If you come back alive and are still interested in astronomy, you might find the following addresses useful.

Happy stargazing.

British Astronomical Association
Burlington House
Piccadilly
London W1V ONL

Junior Astronomical Society
58 Vaughan Gardens
Ilford
Essex IG1 3PD

Ed: This advice on how to prepare for making astronomical observations was submitted by Space Voyager reader, Kirsten McAteer. Although Kirsten is only 13 years old, she's already an experienced astronomer of some seven summers (and winters). I wondered just how useful her advice might be to a mere learner of my advanced age, and so I showed Kirsten's article to *Sky at Night* presenter and *Space Voyager* contributor, Patrick Moore. He had this to say.

*I have read Kirsten McAteer's article. It is excellent. She is doing all the right things, and I strongly recommend any enthusiast to follow her very sensible advice. Would that all people were as logical!*

*Patrick Moore*

Ed: So, Kirsten, I'm at this moment pulling on my thermal socks, putting new batteries in my torch, tucking my Daily Telegraph under my arm and heading for the back garden, where by deck chair, glistening with frost (!), awaits me.

# COMMUNICATIONS BANK

### Survival special

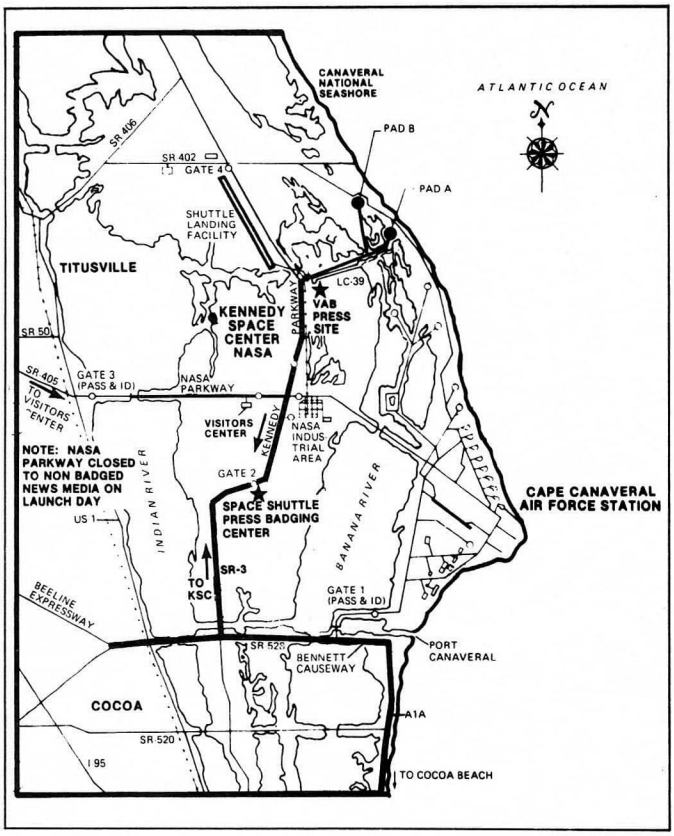
How many people did not see that beautiful 'Survival Special' about the Kennedy Space Centre? Shame on those who have their hands up. They missed a very special programme indeed. The programme's subject was the wildlife reserve that has been established at the centre on Meritt Island. The reserve is actually run by the US parks and forestry commission with NASA acting as a very enthusiastic partner (and a very competent one).

The reserve is home to many rare, unusual and even endangered species of animals and birds such as manatees, ospreys and the symbol of America itself, the bald eagle. The programme also did not ignore the primary purpose of the space centre and showed alongside the wildlife the preparation and launch of a space shuttle. The programme had many moments of sheer magic, such as the buzzards and eagles soaring in the updrafts blowing off the VAB, and a few moments of amusement, like the tortoise outracing the crawler vehicle with the fully stacked shuttle on board. But the one moment that struck me the most was the image of a pair of nesting ospreys in the middle of a small lake with the shuttle rising on twin columns of flame in the background. A most inspiring scene which reinforced my opinion that the people who run NASA and particularly Kennedy are amongst the most civilised and truly human I know of. The double achievement of reaching for the stars and yet caring for our own world is one that really deserves celebration.

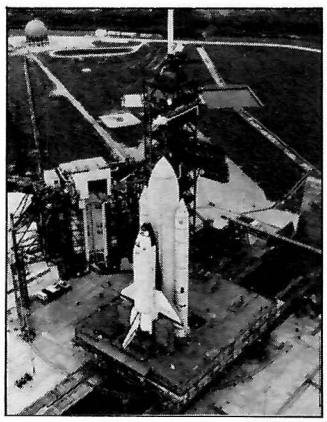
*Littleover, Derby* — *A. Newstead*

**Ed:** *I have to admit that I'm sitting here at the word processor with one hand in the air, feeling suitably ashamed. I missed this programme which was obviously a joy to watch, but Mr, Miss or Mrs Newstead's wonderfully descriptive letter makes up for it in part. When the Survival programme was broadcast, I was fortunate enough to be a guest of the European Space Agency at their ESTEC test facility in The Netherlands doing some research for a book.*

*However, I had the pleasure of being at Cape Canaveral for the first Space Shuttle launch way back in April 1981 and so I was able to see the Meritt Island wildlife reserve for myself. NASA organised tours to keep the world's press occupied before Columbia's first launch. Apart from the groups of buildings, roads and crawler tracks that form the Kennedy Space Centre and Cape Canaveral launch site, the area is still remarkably wild and untouched – before Shuttle crews can practise ditching procedures in a mock-up Orbiter cockpit floating in one of the lagoons near the launch site, the lagoon has to be cleared of alligators (or are they crocodiles?). The insect life is prolific to say the least. Having spent a hot tropical spring night at the Cape, I can understand why the first astronauts to work there christened the insects no'see'um bugs – they bite before you see them!*




***The Kennedy Space Centre sprawls over a wild stretch of sub-tropical Florida coastline, but the authorities have made an effort to accommodate the indigenous wildlife alongside the high technology.*** **Drawing: NASA.**



***The space shuttle on its way to the launch pad. At the Kennedy Space Centre, technology is not persued at the expense of wildlife.*** **Photo: NASA.**

### Big heads return

I have a few points to raise over a letter sent in by Graham Williams of Swansea, published in issue 8.

First of all, he is right in saying that Twizzle and Torchy The Battery Boy were produced by Gerry Anderson but wrong about when they were made (late 1950s).

Second, I disagree on what he said about Terrahawks. He is forgetting that Terrahawks is made for children, not adults. Terrahawks is just a bit of fun to be enjoyed by everybody.

Thirdly, the reason the puppets are what they call 'big head' puppets goes back to the 1960s. After three years Thunderbirds began to wind down, as Gerry Anderson went to see Lew Grade in his ATV offices in Birmingham, about doing another Thunderbirds TV series. But Lew Grade had other ideas. Basically, he wanted something totally different. Hence Captain Scarlet went into production in 1967, but the puppets had fully proportioned bodies.

This type of puppet failed to please the public as when Captain Scarlet went on the air, the show flopped. That is why Gerry Anderson decided that Terrahawks puppets should be 'big head' puppets.

This move has proved to be successful, since six million people watched the series each week. Twenty six episodes were filmed – so far ITV has only showed 13. Since Terrahawks has been a success, I only hope LWT sign for another series.

There follows a list of Gerry Anderson's productions to date:

Twizzle – late 1950s
Torchy The Battery Boy – late 1950s
Four Feather Falls – late 1950s
Supercar – 1959
Fireball XL5 – 1961
Stingray – 1962-3
Thunderbirds (24 TV episodes) – 1964
Thunderbirds Are Go (Feature Film) – 1965-6
Thunderbirds (8 TV episodes) – 1966
Captain Scarlet – 1967
Thunderbird Six (Feature Film) – 1967
Joe 90 – 1968
The Secret Service – 1968-9
Journey to the Far Side of the Sun (Feature Film) – 1969
UFO – 1969-70
The Protectors – 1971-2
The Day After Tomorrow (TV Special) – 1975

**PUBLISHERS' NOTE: The editor reserves the right to shorten letters for publication; opinions expressed by readers are not necessarily those of either the editor or publisher. .**

Space 1999 – 1975-77
Terrahawks (26 TV episodes) – 1983

### Galactica response

Graham Williams' letter in issue number 8 of *Voyager* threw out a challenge I can't refuse. He refers to Battlestar Galactica as 'bad taste poisoning the minds of the young'. Sorry Mr Williams, I can't agree.

Although the basis of his objection is not stated, I take it Mr Williams is representing the Twilight Zone as a series dealing with serious subjects in intelligent ways (hear hear); and Battlestar Galactica as not doing so. May I suggest he takes a close look at some of the topics covered in the various episodes of Battlestar Galactica –

1. War and the total destruction of the home planets of an entire civilization (Saga of a Star World)
2. A food shortage and the threat of starvation (The Magnificent Warriors)
3. Contact with more advanced extra-terrestrial entities (War of the Gods)
4. Murder (Murder on the Rising Star)
5. Politics (Greetings from Earth). The question of medical ethics is also raised here. The decision to place the alien travellers back on course is a triumph for humanitarianists over the politicians
6. The interplay of martial and civilian law and the interference of politicians in military operational matters (Baltar's Escape)

I'm sure Mr Williams would have to agree that these are hardly lightweight subjects. Moreover, all these subjects are treated in an intelligent way which nevertheless manages to remain entertaining.

Finally, lest Mr Williams confuses me with his younger nephew, for the record I'm a married woman of 30 with a degree and professional qualifications to my credit.

*Havant, Wendy Metcalfe*
*Hants*

**Ed:** *One all, I think. Anyone else like to enter the ring and go a few rounds with either Mr Williams or Mrs Metcalfe on the influence (good or bad) and entertainment value of Battlestar Galactica?*

### Sonic screwdriver

With reference to the Doctor Who items in Databank in issue eight. The sonic screwdriver was destroyed by a Terileptil in episode three of the Davison story 'The Visitation', screened on the 22nd of February 1982. As for changing the external appearance of the Tardis – in my opinion it was a publicity grabber just before the Davison/C. Baker regeneration. The name of the show's script editor is Eric (not John) Saward. You may have got mixed up with the producer, John Nathan-Turner.

According to my reference material, Torchy The Battery Boy was first screened in 1957 (a good decade before my time). Gerry Anderson directed all 26 15-minute episodes for Associated Rediffusion. It was Gerry Anderson's second series and it was not shot in Supermarionation.

*Belfast Jeremy Briggs*

**Ed:** *As a Belfast lad myself, I can do no more than applaud Jeremy's research, agree with him wholeheartedly on every point (whether he's right or wrong – the editor's decision is final) and hope that he continues to send such enlightening correspondence!*

### Blade Runner sales

Do you know of any video shops which would sell me Blade Runner? I read your article in *Space Voyager* about science fiction films on video and it said Blade Runner would be a good first buy, but I have tried everywhere to try and buy it, but to no avail.

*Kensington, Brian Ferguson*
*Liverpool*

**Ed:** *When the video business took off in the UK, you could buy most titles in your local video shop. Then the video divisions of the major feature film distributors had second thoughts. Many of them, including Warner Home Video who distribute Blade Runner on video, changed to a hire only system, on the principle that you wouldn't expect to go to the cinema to see a film and bring a print of it home with you to keep. The distributors wanted to maintain a tighter control over their product. However, there has recently been a slight shift in this situation. The video trade papers have reported that Warner Home Video are to switch from lease only to sale only. The switch should have taken place by the time that you read this. RCA/Columbia are reported to have done the same thing. Dealers will have the opportunity to buy up their existing Warner stock, so the best advice I can give you is to visit your local video stores again. They may well be able to sell you a copy of Blade Runner this time or in the very near future.*

### 2001 bludners

Your April/May issue was the first time I have seen your magazine and I was impressed. I would also like to comment on Mr Lane's letter regarding errors in the film 2001: A Space Odyssey. He seems to have missed what I have always considered a true schoolboy howler in this superb film.

On several of the shots from within the Jupiter ship the star field appears to be moving across the opening of the pod bay doors. Also some shots of the pod retrieving the supposedly faulty AE35 unit, taken from a position that is fixed relative to the ship again show a moving starfield beyond the ship.

Surely a view of the starfield would only display such movement if the ship were changing course or in some way swinging about a local axis. The ship's own velocity would be insignificant compared to the interstellar distances involved with those stars in the background. I have often wondered about this and would like to know what Stanley Kubrick or Arthur C. Clarke think.

*Stafford R. C. J. Clay*

**Ed:** *I've passed your subscription order to Infonet for processing and you should receive your first issue soon. On the general point of subscriptions, please send your cheques directly to our subscription agents, Infonet, whose address is given in the tiny print on the contents page. If you send your cheques to me, I have a devil of a job changing Argus Specialist Publications to Ian Graham and adding zeroes to the amount payable!*

*On 2001, I'm not intimately acquainted with the scene you describe, but perhaps other Voyager* readers are and would like to drop me a line with their thoughts.

### *Voyager* unbalanced?

I would like to praise your latest edition of 'Voyager' No 8 April/May 1984. I find it very compelling to read, but I have only one complaint to make. I find that you are tending to slope towards the practical side of space.

In the first few issues of *Voyager* you managed to get the balance right between science fact and science fiction. I only hope that the 'new management' continues to get the balance right again.

*Meltham, Sean Doyle*
*Huddersfield*

**Ed:** *Voyager covers so many disparate fields that achieving the right coverage ratio between them is indeed an important and delicate balancing act. Every magazine to some extent reflects the particular interests and concerns of its editor, especially when it is managed by such a small team as* Space Voyager *is. As a Fellow of the British Interplanetary Society and a member of the American Institute of Aeronautics and Astronautics, my interests naturally lean more towards spaceflight coverage than did my predecessors.*

*The two or three letters I received after the April/May issue saying that it was too 'factish' were greatly outweighed by those welcoming increased spaceflight news and features. However, I fully realise that there are few publications in the UK that cover either spaceflight or science fiction/fantasy and so* Space Voyager *must attempt to feature both adequately.*

*The issue following the one that you bought featured articles on model rocketry, an interview with the new Dr Who, his companion and the programme's producer, the Viking spacecraft on Mars, the robot's place in fact and fiction, inexpensive astronomy, a review of The Right Stuff film, proposals for the manned exploration of Mars, Spacelab's first photos of the Earth, computer space game reviews, science fact and fiction book reviews, a feature on SF writer John Christopher, the Ariane rocket launcher, the Japanese space programme, how SF writers have treated Mars and three prize competitions. This issue contains three interviews with Star Wars, Supergirl and Buck Rogers actors, a news report on SF films from Hollywood, a feature on SF writers who have adopted the inner planets as a theme and reviews of SF films on video.*

*I hope you will continue to buy* Space Voyager *and perhaps you will find that future issues cover science fiction/fantasy in a satisfactory way.*

# COMMUNICATIONS BANK

### More from readers

Having read each of your issues to date, all I can say is how did we all get along without this fine publication? At long last we have our own top quality British magazine which fills a previously substantial gap. The quality of your consistently superb in-depth features is second-to-none, while your supporting photographs are always well-selected, with a crispness and clarity surpassing that of any other SF/fact publication I have ever seen. David Hardy's article on Terraforming was particularly fascinating and it is the first time I have ever read anything about this highly ambitious project. It has features such as these and other exclusives that set your magazine apart from anything else on the market.

However, might I just offer a few suggestions? It might be interesting to occasionally print very short stories and poems from readers, and perhaps to reproduce talented enthusiasts' artwork from time to time.

Your features on modelling aspects are especially inspiring, so why not encourage readers to submit colour photographs of SF/factual space vehicles and suchlike, which they have built. This would highlight their modelling skills themselves, but also creative composition and use of photographic techniques to enhance the models. Furthermore, you could hold the occasional competition to judge these, say once every six months or even yearly. I'm sure the response would be enthusiastic, to say the least, and this would add an extra creative dimension to 'Voyager'.

*Warmington, Northants* *William Paul Clarke*

**Ed:** *Thanks for your kind comments about the magazine. Of course the respected position it now occupies and the enthusiastic readership it has attracted are due to the ground work done by the magazine's creators – Ray Rimell and Mat Irvine. I'm sure they will be gratified to read your remarks.* Space Voyager *will certainly feature short stories in the near future. Readers have already started sending in contributions. I'd advise anyone else interested in submitting SF stories to hold on a while longer and look out for an announcement requesting contributions and laying down the ground rules for presentation.*

*Regarding your comments about modelling, you must rush out and buy the next issue (Oct/Nov) of* Voyager, *because it will contain exactly the sort of feature that you've suggested. Wendy Ingle is at this moment beavering away creating modelling marvels for us and several readers have sent in contributions which I hope to use in the same issue.*

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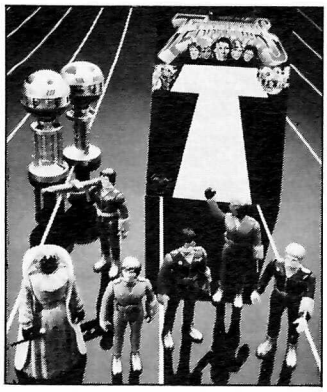
### Repent! repent!

Further to my letter in *Voyager* No 8 – in which I criticised Terrahawks (you, er, didn't really send my address to Gerry Anderson, did you . . ?) – okay, I admit it, I went way over the top. As you suspected, I did feel better getting it off my chest, but I could have been slightly more restrained and constructive, I suppose. In short, I don't regret what I said – but I regret the way I said it. And as for calling kids 'kids', well, if it's good enough for Keith Chegwin it's good enough for me . . .

Unbelievable as it may seem, I'm a fan of Gerry Anderson (yes, I know, with fans like me he sure doesn't need any enemies, right?). But my affection for Gerry's contribution to British television doesn't cloud my judgement regarding Terrahawks.



***Terrahawks merchandising gets the Williams treatment.*** **Photo: Bandai UK.**

I recall hearing on The Electric Theatre Show that Gerry felt restricted by the limitations of string-operated puppets and that he regretted his decision to make the characters in Joe 90 and Captain Scarlet more realistic-looking than the puppets in previous series such as Stingray, Fireball XL5 and Thunderbirds. I presume he felt this way because he wanted to find a new way of operating the puppets, rather than making the existing marionettes look more lifelike.

Personally, I think that Terrahawks is the logical result of such a change in direction. Instead of aiming for the slick, realistic look of his last two puppet series during the 1960s, Gerry obviously decided that now was the time to experiment with a new method of operation and leave the 'realism' behind. This, I think, is where things started to go wrong.

For one thing, I don't think that string-operated puppets were quite as 'limited' in their movements, etc, as many would have us believe. I remember a stunning sequence in an episode of Joe 90 where a vicious argument between two characters was represented by a rapid sequence of photographic stills, while the soundtrack consisted of two shouting voices, both speaking at the same time so that the words became muddled and unintelligible. It worked beautifully. I have yet to see anything to equal that in Terrahawks and I don't really expect to.

Another weak feature of Terrahawks is that the first episode didn't really set the scene for what was to follow. The opening episodes of Thunderbirds, Joe 90 and the live-action series UFO and Space 1999 introduced the characters properly and gave the series a solid base.

Merchandising is an area which has let the series down badly, too. Anyone who remembers Gerry Anderson's sixties blockbusters will probably remember those beautiful comic strips by the likes of Frank Bellamy and Mike Noble. I think most fans of those strips will agree that Look-in's strip version of Terrahawks is awful. Not being a great modelling enthusiast, I can't comment on the Bandai range of Terrahawks merchandise, but I understand that the standards of manufacturing are supposed to be very good indeed. Maybe someone out there has differing views regarding the series. If so, I'd be interested in what they have to say.

*Mayhill, Swansea* *Graham Williams*

**Ed:** *Now you're really in trouble if Keith Chegwin's your guiding light! This time I've forwarded your address to Look-in so that they know where to deliver the legal documents. By next issue I fully expect to have received another letter completing your transformation, saying that Terrahawks is the best puppet series to date, proposing a knighthood for Gerry Anderson and asking Look-in for a five year subscription if they'll just drop the charges.*

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### Elusive SW kits

Where can I get hold of Star Wars model kits? I've searched the shops in my area, but can't find them. I picked up three of the Jedi kits in Southampton, but I can't get the rest anywhere. Do you know whom I can contact for more information?

I would like to see more Star Trek/Battlestar Galactica reviews in *Space Voyager*. No-one seems to cover the latter in any form. Keep up the good work.

*Haslemere, Surrey* *Alan Smithers*

**Ed:** *Thanks for your extremely complimentary comments about* Space Voyager, *which modesty moved me to cut from the above extract from your letter. The Airfix range includes a series of Star Wars kits – Rebel Snowspeeder, Battle on Hoth, Dagobah, AT-AT, Rebel Base, X-wing Fighter, Jabba's Palace, Speeder Bike, Imperial Star Destroyer, Imperial Shuttle and the Millenium Falcon. The A-wing, B-wing and X-wing fighters and a Tie Interceptor are also available as a boxed set for under £10. I can do no better than to refer you to one of* Space Voyager's *regular advertisers – Jones Models, 56 Turnham Green, Chiswick, London W4 1QN (Tel: 01-994 0858), who operate a mail order service. So, even if you aren't likely to be in the Chiswick area, your Star Wars kits can be delivered to your doorstep mail order. Please see Jones Models' advert for details of postage, etc or telephone them directly.*

# REACHING FOR THE STARS

THE STARS ARE UNIMAGINABLY FAR AWAY, BUT ONE DAY WE WILL VISIT THEM BUT HOW?
TEXT AND PAINTINGS BY DAVID HARDY

*Above: Photon Starship. © David A Hardy.*

Once upon a time, the idea of travel to the stars was as impossible as travel to the Moon. Today, a dozen men have walked on the Moon and robots, designed and constructed by men, have landed on the nearer planets and flown past the outer ones (or are about to). It is only a matter of decades (given that we do not blow the entire human race into space beforehand) before men walk on the planets and satellites of our Solar System and even build permanent bases there.

So, how long before Man, or his creations, reaches the stars? Firstly, we have to appreciate the difference in scale between travel to the Moon – figuratively speaking in our back yard – the planets, and the stars. The Moon is a mere 240 000 miles (385 000 km) from Earth, while Mars can approach to within 35 million and Venus 24 million miles at their closest. For people who may travel from a few hundred to some tens of thousands of miles in a year, these numbers are virtually impossible to comprehend. Yet the nearest star is 25 million million miles away: that's 25 with 12 zeros . . . It makes much more sense to use the a speed of light as a yardstick when dealing with interstellar distances. Light travels at a constant 186 000 miles per second (300 000 k/s) in round figures, which makes the Moon 1.3 light seconds away, the Sun just under 9 light minutes, and the nearest star – Proxima Centauri – 4.2 light years.

Our island universe, the galaxy which we call the Milky Way because of the misty pathway its closest spiral arm makes across our night sky, contains over 100 billion stars is 100 000 light years from edge to edge with a central bulge 10 000 light years across is 1000 light years thick, and it is 30 000 light years from our Sun to the galactic centre. It also contains vast amounts of interstellar dust, which obscures the light of more distant stars and could be a hazard to star-travellers; of gas – which may be a help; and an unknown number of planets and satellites belonging to the stars. This number may be anywhere from none (apart from our own) to billions, depending upon whose estimates one chooses. I prefer the latter, but that does not make it right!

Beyond the Milky Way are billions of other galaxies, basically similar to our own, though sometimes irregular or elliptical in shape rather than spiral. The stars and planets within each galaxy obey the same physical laws as our own and contain the same elements, as can be proved by means of the spectroscope, by far the most common element being hydrogen. Many stars travel through space in pairs, known as binaries, or families of three or more. Usually these are of different spectral types, which is to say that for instance a huge, red supergiant may be accompanied by a small bluish star, or an orange giant by a white star like our own Sun, which is a very average star in size and brightness or luminosity. It now seems probable that such multiple star systems do not normally possess planets; but that single stars may do so because in their case the process of stellar formation led to enough material being left over to provide for small, non-luminous bodies instead.

### Interstellar speed limits

In view of the vast distances already mentioned, we may as well concern ourselves only with our own galaxy. (Other races may object to the expression 'our own', but if so they know where to find me!) It is obvious that at the sort of speeds achieved by our spacecraft so far – a few tens of thousands of miles per hour – it would take centuries or thousands of years to reach the planets of other stars. It is rather pointless to speculate on the possibilities of hyperdrive, warp speed or whatever, since we simply have no idea at present of how these might be achieved, altough they remain the stock-in-trade of the science fiction writer, for whom travel between the stars within a reasonable time-scale is often a necessity.

The limiting factor, according to Einstein's equations, is the speed of light, and even that poses its own problems. An Irish physicist called Fitzgerald calculated that as a physical body approaches this velocity its mass increases but its length (in the direction of flight) contracts, to a theoretical infinite mass and zero length as the speed of light is achieved A mass of infinity would presumably require an infinite mass to propel it, so there is not enough material in the entire Cosmos . . .

It is worth noting at this point that not so many years ago just about every expert in the field of aeronautics stated categorically that the sound barrier could not be broken – yet today Concorde regularly carries its passengers in comfort through the upper air at several times the speed of sound. For that matter, when it came to air travel the best that most science fiction writers such as Jules Verne could come up with by the end of the 19th century was an even larger and more elaborate version of current airships or balloons. In the same way, today's thinking is limited by today's technologies. Even by 1940 few scientists would stake their reputations by stating that travel to the Moon was possible, yet a mere 30 years later, there we were. It may be that some method, at present not even dreamed of, will enable us to circumvent the light barrier. For the purpose of this article, though, we can only review methods of interstellar travel which employ current technology, or that on which we can extrapolate; but take heart from the fact that to our forefathers, 100 years ago, television or digital computers were simply unthought of.

Looking at the distances and time-scales quoted earlier, it may seem that travel to the stars is out of the question anyway. The closest star is Proxima Centauri – a dim red dwarf which is a member of a triple system consisting of stars A and B and Proxima, so-called because it is the closest. As we saw, even at the speed of light it would take over four years to get there, but being a multiple star system there are probably no planets anyway.

### Wavy orbits

Most of the stars likely to have planets would take tens or hundreds of years to reach. At least by the time we are ready to do so, space-based telescopes with powers of resolution far greater than any at the bottom of Earth's dirt-laden atmosphere will almost certainly have pin-pointed those stars with suitable worlds revolving around them: for the present we have to content ourselves by examining candidates like Barnard's Star, which betrays the presence of probable large Jupiter-like planets by moving not in a straight line but a wavy one, due to its centre of gravity being perturbed by a relatively large but telescopically invisible object.

However, for prospective star travellers the picture is not quite so black as it first appears. The snag is that the civilization which provides the very considerable funding for such an expedition to distant stars may never learn of the results or rewards of its investment (though these are likely, ultimately, to be many). Only the voyagers and their descendants in Earth's future will ever know what wonders were found.

Part of Einstein's Special Theory of Relativity provides for a phenomenon known as time dilation. Put simply, this means that time would appear to slow down for the interstellar astronauts, compared with time measured by a *stationary* observer, who for our purpose we assume to remain on Earth. That is to say that if he could see the voyagers' clock, he would say that theirs was running slow. This effect increases as the speed of light is approached, until at the speed of light – could it be reached – time would appear to stand still compared with an observer on Earth.

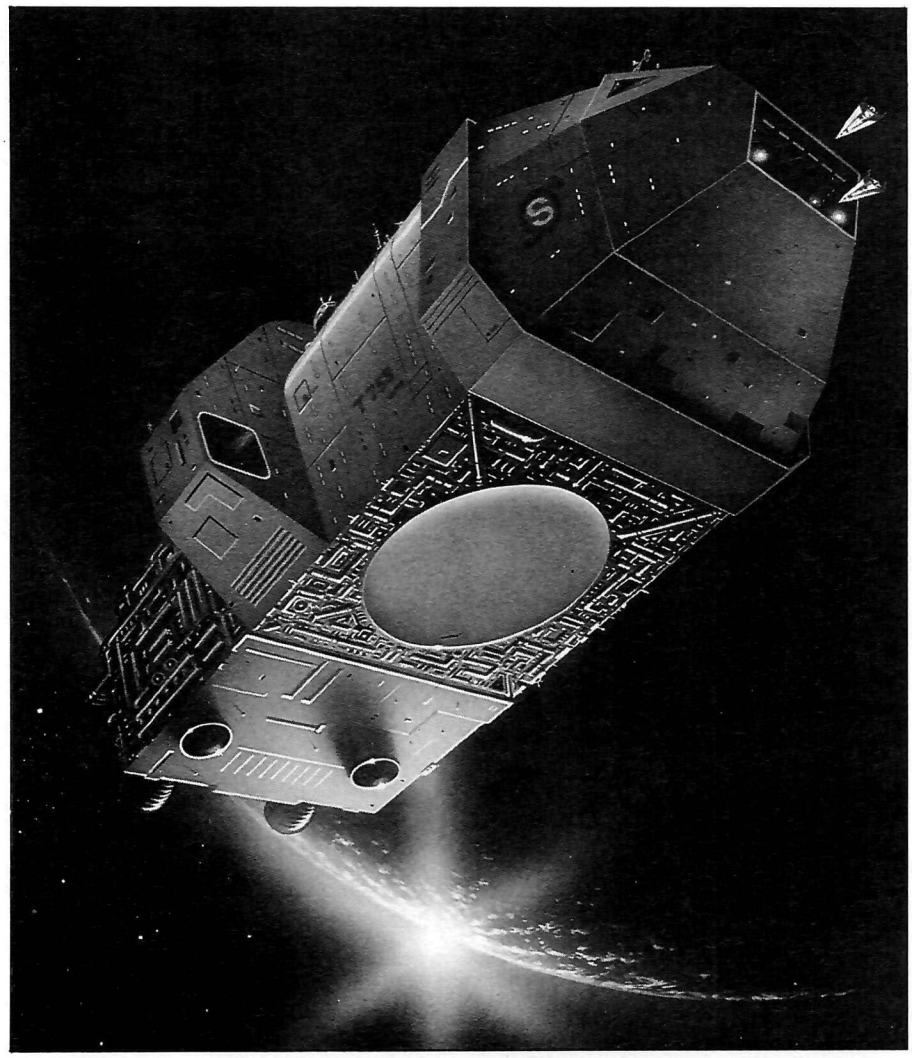
This does not apply only to clocks: the biological processes of the travellers, chemical reactions, atomic decay (radioactivity) – all will be slowed down by an equal amount, so naturally the crew will not be aware of it, any more than they will be aware of the Fitzgerald Contraction or the increase in mass. This has the interesting result that if a velocity of 99 per cent of light speed could be a attained and a star 100 light years away selected, the round trip would take less than 30 years by the astronauts' reckoning, but 200 years will have passed on Earth when they return.

Let us assume that a constant 1 g acceleration can be applied to our starship (ie equivalent to the effect of gravity at Earth's surface – a convenient effect in itself). At this rate, a speed of 60 million mph would be attained in about a month, and light speed (theoretically) in just less than a year. The time dilation effect increases with distance and duration of voyage. A round trip to, say, Epsilon Eridani, which is about 11 light years away, would take up 10 years of the travellers' lives, while 22 years would have elapsed on Earth when they returned. But the centre of the Milky Way, 30 000 light years distant, could be reached in 40 years shipboard time, while 60 000 years passes back on Earth – and the neighbouring Andromeda Galaxy, 2 million light years away, would take only 55 years while Earth aged 4 million years! This may sound as fanciful as SF's hyperdrive, but the effects of time dilation have been confirmed experimentally in various ways, and there seems no reason to doubt its reality.

Incidentally, we must remember that at a constant 1 g acceleration our ship would simply shoot past the target system at close to light-speed: for half of the journey we should need to decelerate at 1 g so as to go into orbit around a suitable planet on arrival. Smaller landing vehicles would then leave the mother ship to place men on the surface, or winged 'scouts' may reconnoitre.

### The Doppler Effect

Travelling towards a star at close to the speed of light will give rise to some strange effects, the main one being caused by the Doppler Effect. Our starship will be accelerating into the light waves emanating from the target star, which thus *appear* to shorten in wavelength: ie more of them pass the ship than would if it



*A vast interstellar colonizing ship orbits a new world, while shuttlecraft – looking like tiny white moths – are prepared to land on the surface. (From Galactic Tours by David Hardy and Bob Shaw: available from Astro Art – see* Space Voyager *No. 8.)*

were stationary. The star's light will therefore be shifted into the blue/violet end of the spectrum. A star similar to our Sun will at first appear normal, ie yellowish, then become green, blue, violet, until at close to light speed its light will pass into the invisible ultra-violet. On the return journey the reverse takes place, and the star shifts towards the red and infra-red, while ahead our Sun is blue-shifted.

A higher rate of acceleration than 1 g would of course shorten subjective journey times still more, but elapsed Earth time would remain the same. Star travel, then, is also a form of time travel, since the voyagers would, in the space of a few tens of years, be able to see Earth in its far future. Fascinating though this would surely be, they would undoubtedly have very mixed feelings about returning to such a changed world; unfortunately there is no way that they could relay that information to their own contemporaries.

Suppose that somehow we were in a position to start building a starship today. What method would we choose? The British Interplanetary Society, which in 1939 published a design study for a manned landing on the Moon containing many features eventually incorporated into the Apollo project, has over the years come up with a number of stimulating ideas for star travel. In 1952 L. R. Shepherd took a proposal made as long ago as 1929 by J. D. Bernal for a 'space ark', and suggested that instead of building one from scratch a hollowed-out asteroid might be used. Within the not-too-distant future we shall almost certainly be mining the asteroids for their mineral resources, so a mined-out asteroid could make an ideal starting point.

The advantage of a space ark is that it offers a method of reaching the stars at comparatively modest sub-light speeds, using perhaps ion rockets and possibly consuming part of the asteroid itself for reaction mass. The disadvantage is that the crew which leaves Earth will never see their vessel's destination; only their descendants will arrive, and to them Earth will be known only from stories, books, films and tapes. But the ark will be large, so can contain a closed-cycle ecology, with many varieties of plants, crops and even animals.

### Starship Daedalus

A more recent design-study by the BIS is for an unmanned starship, named Daedalus. It does seem to make sense to send robot probes first – the only problem being that all data and information relayed back to Earth will be limited by the speed of light. Daedalus has gone through various phases, but basically the scheme is to send a two-stage vehicle, with a main primary engine some 400 feet in diameter generating its thrust from 'micro-pellets' of deuterium and helium-3 expelled into a magnetic field and providing 250 miniature nuclear explosions per second – a nuclear pulse-jet. The second stage, with a 500-ton payload, would achieve a speed of about 14 per cent of that of light, and after 47 years would release from 10 to 20 highly sophisticated computerized robot probes in the vicinity of Barnard's Star. Not having any deceleration facilities, the ship would flash through the system in under 10 hours; six years later its signals would be received on Earth for analysis.

Many other proposals have been made for vehicles and propulsion methods for travel between the stars, some more practicable than others. Here are a few of the most hopeful:

### The light sail

We may expect practical experiments with these, within near-Earth space, quite soon. For starflight, sails made of thin metallic or reflective plastic film, hundreds of miles across, will tow payloads at the end of fine, very strong cables. They will be propelled first by the pressure of radiation from the Sun, and later by radiation from other stars. Or they may be propelled by banks of powerful lasers placed in orbit round the Sun and drawing energy from it, as proposed by Robert L. Forward. This relatively cheap system is best for unmanned missions, since halting the craft on arrival poses problems – though not insuperable ones.

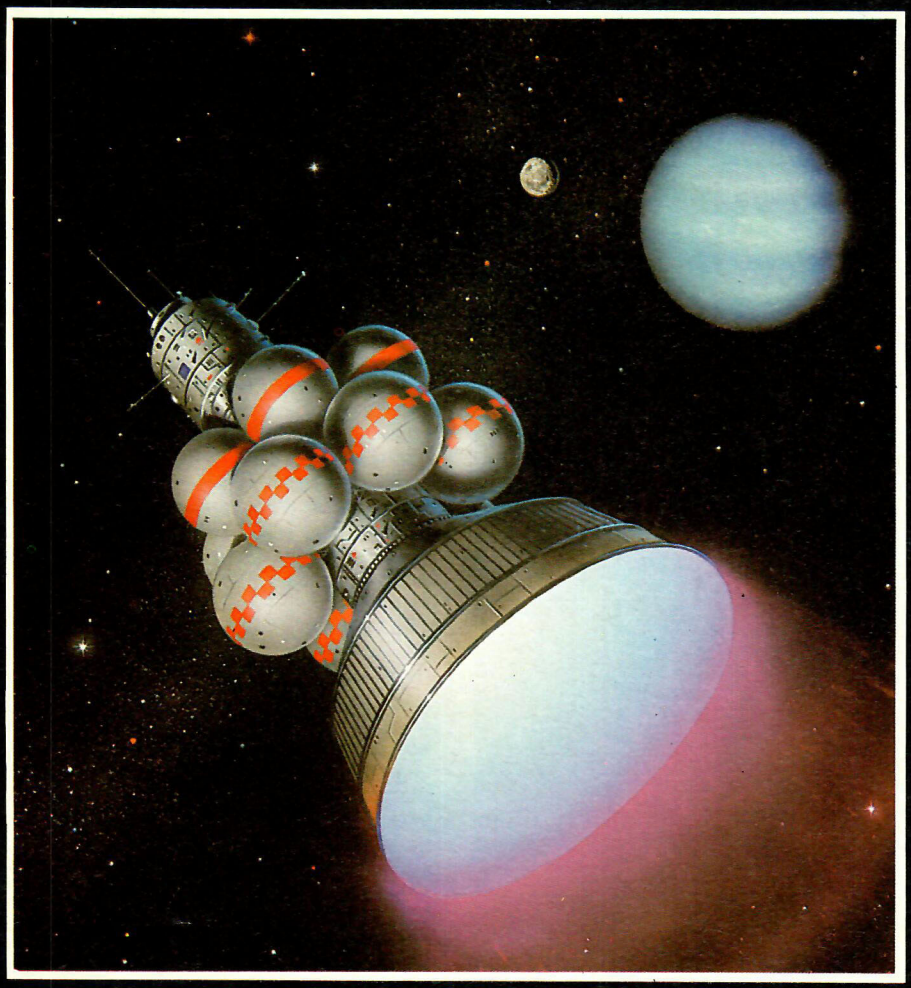
### The ramscoop

The interstellar ramjet, first proposed in 1960 by Robert W. Bussard, is another design which attempts to solve the problem of carrying vast stores of fuel along. As we saw earlier, interstellar space is far from empty; it contains hydrogen, thinly spread but in quantities which could be collected by a magnetic scoop a few thousand miles across, delivered to a fusion reactor, and ejected as a propulsive jet. The faster it travels, the more fuel it collects. A barrage of lasers would be necessary to vaporize the dust and solid particles also present in space, which could otherwise wreck the craft. At the target system the field could be reversed to act like a magnetic 'drogue' parachute.

In 1970 Dr Anthony Martin of the BIS found a number of problems with this system, such as energy losses. Acceleration could not continue indefinitely, or the vessel would be ripped apart; so we may need to await the development of new, hyperstrong structural materials. Martin suggests spun diamond fibre

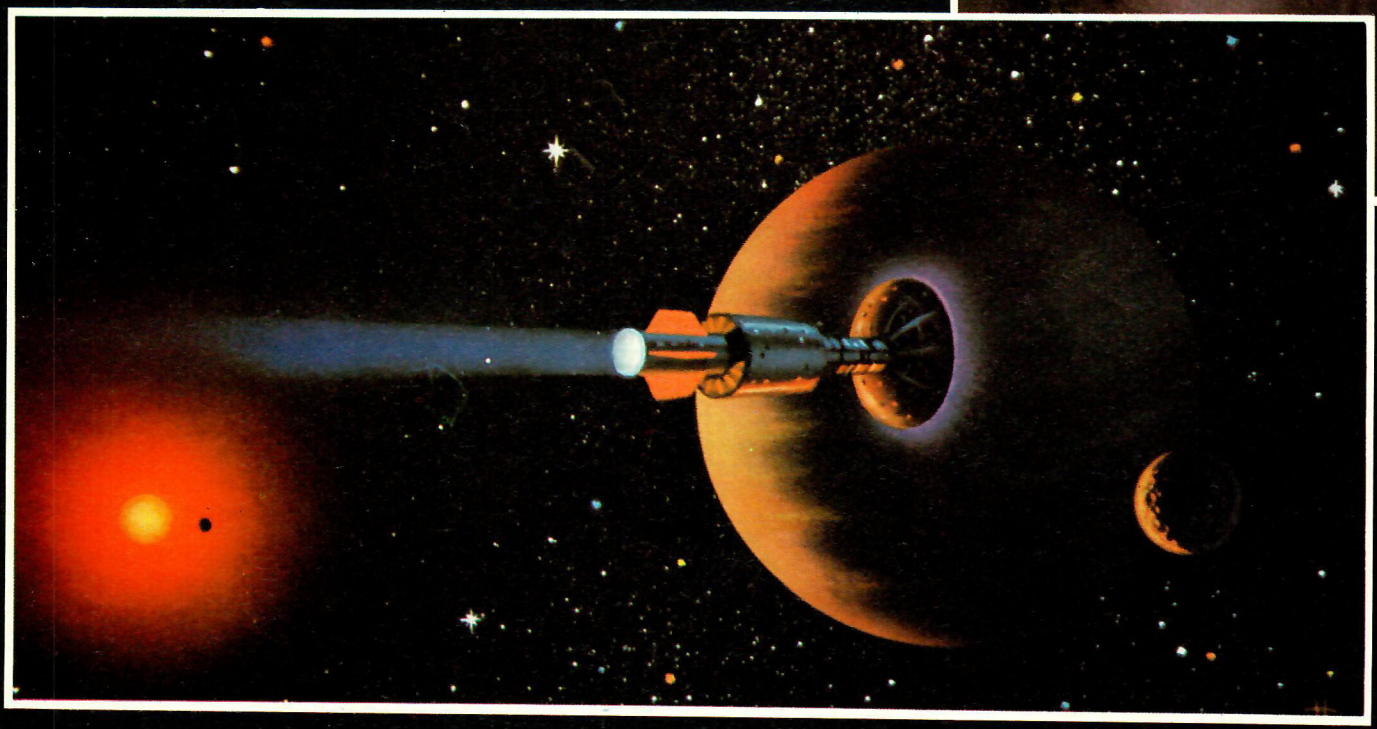
### The Enzmann Starship

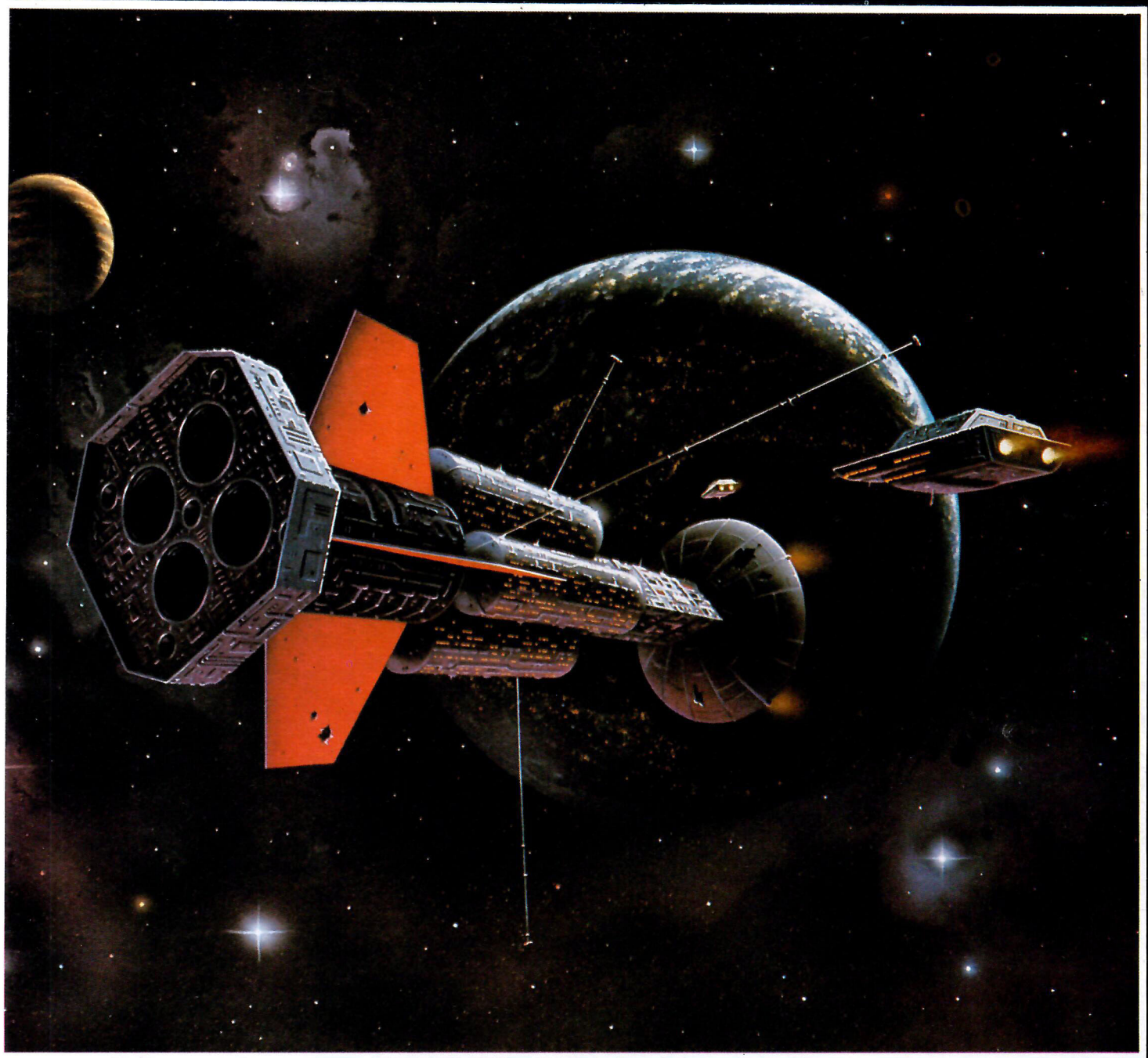
Dr Robert Enzmann proposed this in 1964. At the front of the vehicle is a 1000-foot-diameter sphere of frozen deuterium (heavy hydrogen), which acts as fuel for eight nuclear pulse-jets of the Orion type. This differs from Daedalus by using what are effectively hydrogen bomb explosions at the rate of one per second, their shockwaves smoothed by a huge 'pusher plate'. The ship itself consists of three cylin-



*Above: Daedalus passing Neptune.*
*Below: Bussard Ramjet passing Barnard's Star.*
*Right: Ramscoop arrives at its destination damaged.*

*© David A Hardy.*





drical modules, each 300 feet long and docked end to end, each containing hundreds of sub-modules acting as living quarters for 200, laboratories, stores, recreation rooms, etc, spun to provide artificial gravity. The giant snowball acts as a shield during flight, but the scheme depends upon finding suitable gas-giant planets in order to replenish the fuel on arrival. Construction of the ship would be done in a part of the Solar System where there is plenty of free hydrogen for the taking – in orbit round Jupiter. A fleet of from 3 to 10 ships is envisioned, the modular construction minimizing any catastrophes.

### Photon Drive and Anti-matter

The most efficient form of propulsion for a starship would be a beam of pure light. This could be produced if *all* the propellant mass could be converted into energy. Unfortunately we have no idea of how to do this. The next best thing might be the use of matter and anti-matter (a method routinely used by the starship Enterprise). These, *if* they could be stored and then brought together, would instantly annihilate each other in a burst of energy – 100 per cent efficiency, compared to which a hydrogen bomb is only 0.4 per cent efficient. Research into anti-matter is in fact very much more advanced than is widely known.

All of the above, while somewhat esoteric by today's standards, are based on sound principles. Other proposals, put forward nonetheless by highly-respected authorities, may sound even more far-out. Carl Sagan, for instance, seems attracted by the notion of using black holes as a sort of galactic Underground system, with travellers leaving through one hole and reappearing at another, light years away. It sounds a risky procedure! Suspended animation is another method of shortening subjective travel time. The travellers would wait in cold storage until automatically awakened at their destination. Arthur C. Clarke took this a stage further by considering a ship containing only human germ cells. The eggs would be fertilized some 20 years before arrival, the children being brought up by robotic or cybernetic 'nurses' and fully trained for their tasks on the new world by the time they land.

It would take a very different culture from today's to accept many of these proposals, but most are at least more sane than the penchant of 20th century governments for hoarding horrendously excessive quantities of nuclear overkill weapons. Had we taken a different road, the problems of the so-called Third World might now be non-existent, and we could have funds aplenty for discovering true New Worlds. It is up to the readers of magazines like this to ensure that it is not too late

# STAR TREK III
# THE SEARCH FOR SPOCK

IN A SURPRISE MOVE, UIP, BRITISH DISTRIBUTORS OF *STAR TREK III, THE SEARCH FOR SPOCK*, HAVE BROUGHT THE FILM'S RELEASE DATE FORWARD TO JULY 27TH, ONLY A MONTH AFTER THE US RELEASE. DESPITE THE ABSENCE OF THE USUAL PRE-RELEASE PROMOTIONAL PUBLICITY, BECAUSE OF THE FILM'S HICCUPPING RELEASE SCHEDULE, WENDY GRAHAM'S PRELIMINARY REPORT GIVES YOU A GLIMPSE OF THE LATEST ADVENTURES OF THE ENTERPRISE AND ITS CREW.

*A distinctly casual-looking 'Bones' McCoy eyeballs the Admiral amidst the polystyrene.*

Photo: © 1984 Paramount Pictures.

*The television series regulars are all back on the bridge of the trusty Enterprise for its third foray into the unknown.* The Search for Spock *seems to be holding their undivided attention.* Photo: © 1984 Paramount Pictures.

*Engineer Scott joins the bridge team during a tricky moment in the search for the director! Even 'Bones' has abandoned his sick bay.* Photo: © 1984 Paramount Pictures.

In Science Fiction, death is not a permanent or necessarily fatal condition. Leonard Nimoy, director of Star Trek III, said in April, 'The film is called The Search for Spock and I think it would be foolish to do a film of that title and have Admiral Kirk, at the end of the film, turn to the audience and say 'we didn't find him!'.

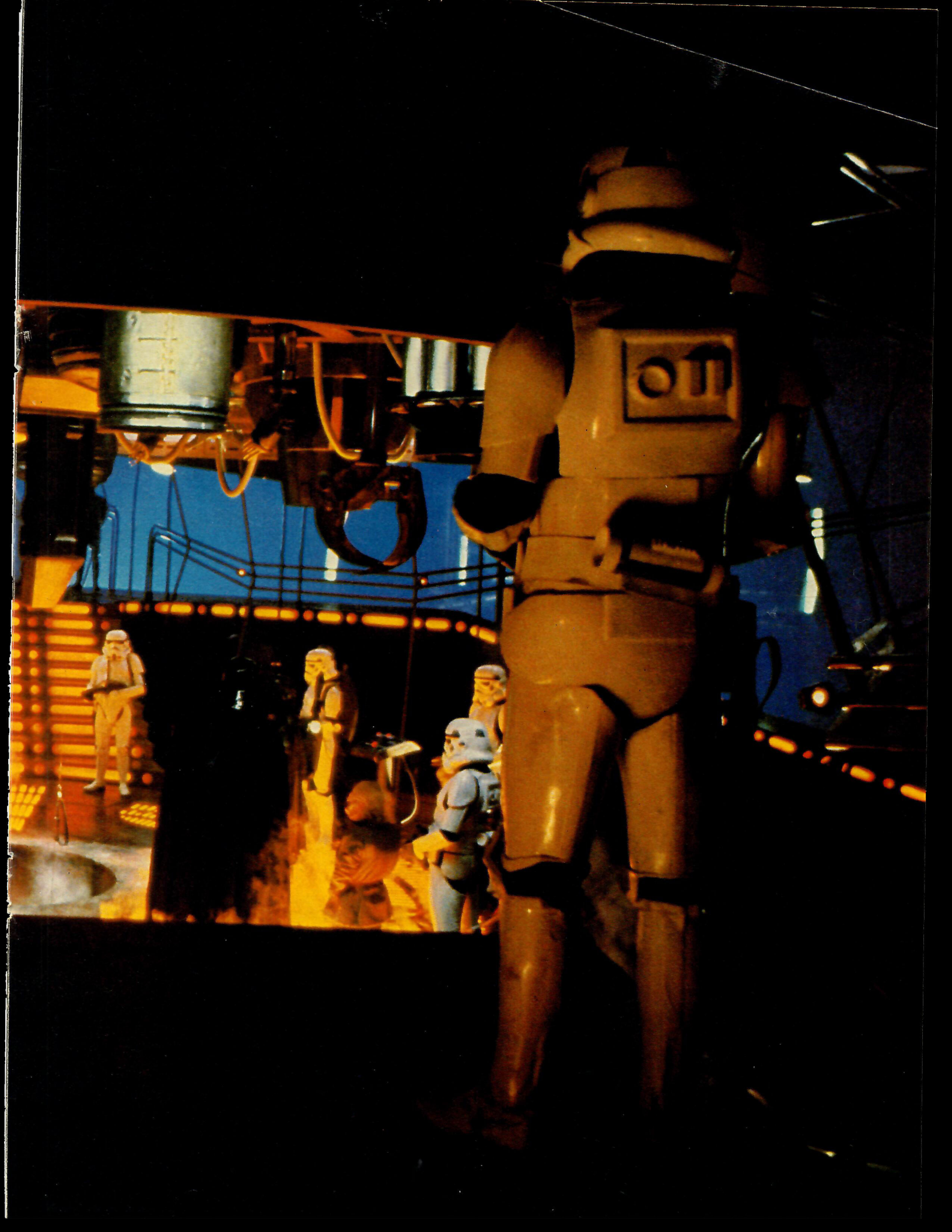
But the film *could* be called 'you win one and you lose one', for while Trekdom will celebrate the return to life of perhaps the most famous alien of them all, there is a loss which might hurt even more, and this time there's no resurrection – or corbomite. That excepted, *The Search for Spock* is very much a film in the old Trek mould. Nimoy has made it a film about the characters and their inter-relationships, which, with some fine scripts, was the TV series's finest quality. And at last Nichelle Nichols as Uhura and George Takei as Sulu get to do more than 'open hailing frequencies' and steer.

### TV favourites return

Performances in the film from all the old gang have brought praise – and there's a welcome return cameo from first season TV regular Grace Lee Witney as Chief Janice Rand. Star Trek's resident alien Mark Leonard dons pointed ears again to appear in his most popular alien role as Sarek, Spock's father (there's a rumour that they'll let him play a human in *Trek IV!*) and since everyone knows that Vulcans love tribbles and vice-versa the little furry breeders get to nibble their popular way through a scene.

David Gerrold has said that the special effects for this film are some of the best he's ever seen, not just in *Trek,* but on the SF screen generally. Perhaps *Star Trek* might at last be in with a chance of award recognition, something it surely deserves as a phenomenon of the entertainment industry. Not only did *Star Trek* open up the world's TV and big screen floodgates for SF, but it paved the way for many a revival of popular series after their respective demises – and I can't think of any other show which still has the original cast filling all the main roles in a story with beginnings in 1963. That alone must merit some sort of recognition and celebration.

In the next issue of Space Voyager, we hope to bring you a full colour review feature on *Star Trek III, The Search for Spock.*



# VENUS TO THE SUN

**CONTINUING THEIR PLANETARY TOUR OF THE SOLAR SYSTEM, MARION AND RICHARD VAN DER VOORT REVEAL HOW THE INNER PLANETS, FROM VENUS TO THE SUN, HAVE INSPIRED SF WRITERS**

The ancient Greeks, in the habit of labelling everything, mostly did not recognise Venus as a planet, but called it either the morning or the evening star. Phosphorus or Hesperus. The Romans followed suit by naming them Lucifer or Vesper, according to whether they preceded or followed the sun. One could put forward an imaginative hypothesis that the ancient peoples had inferior eyesight, perhaps due to a diet deficiency, as they not only failed to identify Venus, but also spoke of the 'tri-coloured rainbow'. Today most people can distinguish at least five colours in a rainbow and even in the smokey atmosphere of London, Venus can be observed in crescent phase.

Venus shows itself in phases, as does Mercury, because they are between us and the Sun, and Venus is so bright because it is covered with a thick reflective cloud layer that hides any surface features from us. Even after telescopes were invented we learnt little about our nearest neighbour, but conjecture, sometimes disguised as science fiction, leant towards a planet of vast waters and much rain.

It is surprising to look back a half century to Olaf Stapledon's *Last and First Men*, first published in 1930. The last Terran civilisation, roughly 500 million years from now, had access to the past mentally. Their space travel was restricted to the little span between the orbits of Mercury and Jupiter, although they possessed very powerful rockets fuelled by the annihilation of matter. They also had a means of carrying air compressed to protons and electrons, as well as artificial gravity.

But Stapledon's humans find themselves threatened by the imminent break-up of the Moon and have to take refuge elsewhere. Mars is dead, so Venus is selected, despite being almost entirely covered by fresh water, extremely hot, and habitable only at the poles. As Venus took several weeks to rotate the planet is cursed by perpetual storms, fog and ice at night. Electrolysis stations are set up to split up water and feed the oxygen into the air.

Then it was discovered that a semi-civilised people dwelt in the depths of the seas, existing on radioactive elements. But fortunately they were already doomed as radioactivity decreased, so they were humanely destroyed and the whole race of humanity moved to Venus, and indeed stayed there for the next 500 million years.

### Watery beauty

C. S. Lewis, having brought his hero, Ransome, safely back to Earth after his trip to Mars, sent him off to Venus in 1942 in *Voyage to Venus,* and *his* version, equally watery, is beautiful. The green sea is reflected back by a sky of pure, flat gold and on that sea islands of matted vegetation float, supporting trees and bushes. At sunrise and sunset the sun can be seen as an arc of green resting on the rim of the sea, too luminous to look at, and behind a great fan of colour like a peacock's tail.

Ransome finds that there are only two people on the planet, both green; in fact the Venerian Adam and Eve, called Tor and Tinidril. Tor has disappeared and Tinidril is being tempted by Ransome's old enemy, Weston, to wear clothes and to live on the fixed land that is forbidden. I do not know enough about theology to discuss this, but Tinidril's remark that to save food for tomorrow is to distrust God seems to parallel the contemporary thought that the gather-hunter tribes still existing do not war or steal as they have nothing to take. However, despite the religious overtones the descriptions and concepts are fascinating.

Yet another hero, not strictly in my brief, but shining as brightly as Venus itself in the annals of SF, is Colonel Dan Dare, conceived and drawn by the great Frank Hampson in the early 1950's. Dan Dare, Professor Peabody (a female) and Dan's batman, Albert Fitzwilliam Digby; made the first trip to Venus and found it divided by a flame belt along the equatorial region with the Therons, blonde goodies, on one side, and the Treens, green baddies, on the other. The Treens were far more interesting, being logical scientists, apart from Sondar, who like John Carter's friend on Mars was the only Treen to feel emotion. Even so, the Mekon, who travelled through the air on a little platform, having a body half the size of any other Treen and a head (and presumably brain) four times the usual size, gave several admirable imitations of hate and malice from time to time. He also used very colourful language. *'By the Magnets of Mekonta, Dare still lives!'*

NEL 2838 NEW ENGLISH LIBRARY SCIENCE FICTION
Robert Heinlein
Between Planets
"He is the acknowledged master in this field"
TIMES LITERARY SUPPLEMENT

### Dragon equality

Robert A. Heinlein wrote several books about

Venus, mainly on the swampy side – vast wet jungles with either primitive natives or seemingly primitive natives. Heinlein excels in setting humans at home on other worlds. For example, Don Harvey of *Between Planets* has a mother who is a second generation Venus colonial and a father born on Earth. They met on Lunar, and Don himself was born in space. He is studying on Earth when war breaks out between Earth and the colonists and tries to get back to Mars where his parents are at present. Instead he gets stuck on a Venus invaded by Terrans. Fortunately he whistles the native language, has a Venerian name of his own, *Mist on the Waters,* and has palled up with a dragon descended from the Original Egg, who goes by the Terran name of 'Sir Isaac Newton'. The Venerian dragons are intelligent, scientifically minded, long lived, wealthy, heavily armoured and on the large side. Homegrown colonists, such as Don, are aware that the dragons are equal to humanity, although the Earth humans think of them as animals.

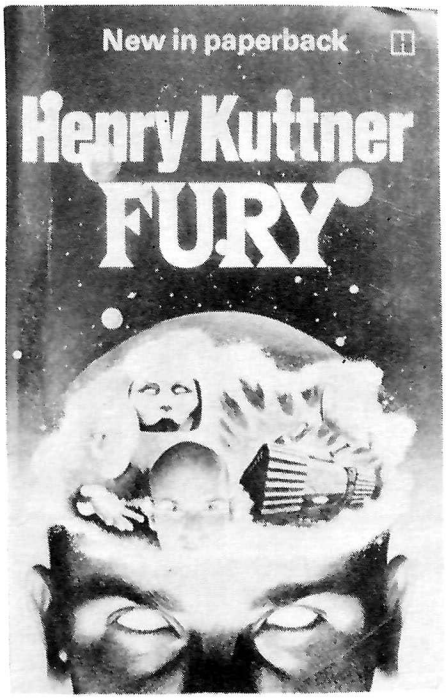
In *Podkayne of Mars* we see Venus through the eyes of a human-descended Martian, who doesn't approve of the planet at all. In *Space Cadet* published in 1948, Heinlein describes yet another Venus, still foggy and muddy, inhabited by many carniverous monsters of various sizes and by a race of beings of whom only the females are ever seen. They are short, triangular-headed amphibians who live in underwater colonies. Luckily, one of the cadets is Oscar, who is Venus born and helps the others in the party to realise that these oddities are really people despite their apparent simplicity and in the end it is the natives' unsuspected technology that enables the cadets to return home.

Henry Kuttner started writing about Venus in the late 1940's. His *Fury* also shows mankind on Venus, but Earth has been made uninhabitable by a war and Venus is in the equivalent of Earth's Jurassic period with fierce jungles and fiercer reptiles. Humanity is cowering safely in the ocean deeps. Like most of these stories, the planetary background is only background and the basic plot tells of the mutant Immortals and of Sam Reed in particular. Reed is deprived of his heritage at birth by his father and in revenge forces dwindling mankind to leave the safe water for the surface of Venus to start again. This is probably among the best ten SF books ever in my estimation.

### Solar Insanity

Ray Bradbury toyed with a Venus on which the sun only shone for an hour every seven years and with one where the rain never stopped, and mankind built Sun Domes to keep themselves sane. Roger Zelazny has a leviathan-haunted water world in *The Doors of his Face, the Lamps of his Mouth,* and John Varley has a tourist on Venus with a transplanted infra-red eye, so as to keep track of the sun, in *In The Bowl.*

Eric Frank Russell achieves a story of invaders from Venus, parasitic intelligences that manage to take over the bodies of the first Venus Expedition in *Three to Conquer.* Mention must also be made of the *Carson of Venus* books by Edgar Rice Burroughs, where Venus is covered by a double layer of clouds to temper the sun's heat and also seems to dull down the adventures. Certainly the Venus books rarely reached the heights of the John Carter series.




### The real Venus

But in the 1960's we started to land probes on Venus and the mysterious planet promptly became the peculiar planet. It is circular both in shape and orbit, rotates the opposite way to most other planets and the Sun, and has a 'day' of 243 Earth days and a 'year' of 225 Earth days. Most of it consists of flat plains with a few titanic mountains, with no water at all. Venus is almost our twin in size and is not that much nearer the Sun than we are, yet the temperature on the planet's surface is far higher than the mere 100 degrees Centigrade that turns water to gas. There may once have been water on Venus, but the carbon dioxide clouds let heat in and keep it in (the 'greenhouse effect'), so Venus seems likely only to get hotter and hotter.

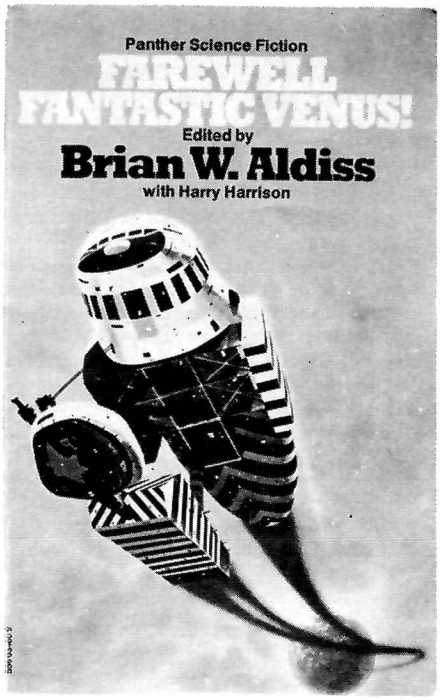
Immanuel Velikovsky has put forward the idea that Venus was spat out of the Red Spot on Jupiter and nearly collided with several members of the Solar System before settling down in its present orbit, all within recorded history. That might make interesting fiction but for his boring habit of trying to make people believe him.

Poul Anderson's *The Big Rain* envisages men setting out to terraform Venus and this is certainly possible, if both expensive and likely to take a long time. But in a few centuries it is possible that we might walk, or even swim, on Venus.

### Mercurial disappointment

In contrast Mercury is not nearly so interesting as was once thought. Originally it was suggested that Mercury had one face permanently fixed towards the Sun, which would have made it both the hottest and the coldest planet in the Solar System at the same time, but we know now that it does rotate, having days and nights of 88 of our days each. Basically it is just a boring, hot, large lump of rock, as far as we know, nothing to write about, in fact. Isaac Asimov, in one of his jocular moods and *Runaround* gives us the robot Speedy that gets drunk on carbon-monoxide and staggers around reciting Gilbert and Sullivan and John Varley in *Retrograde Summer* pictures a tourist visiting Mercury with a quicksilver pool that can be swum on. Alan E. Nourse imagined a *Brightside Crossing* across the side facing the Sun, but the only value that Mercury might have as a settlement is to tell us more about the Sun from a front seat.

We know now that we understand very little about the processes of forming stars and planets. We can classify other stars into red giants and white dwarfs. We have a feeling that other stars have planets, but they often seem to be double or treble star systems and we see novas and supernovas happen without understanding why. The Sun is the centre of our life. If it gets temperamental we could die in seconds. Without it we would live a few months at best, yet it is still mysterious. Ray Bradbury in *The Golden Apples of the Sun* postulates a ship that actually brings back a sample of the sun's substance to work on, but this is way beyond our technology at present. Larry Niven's *Inconstant Moon* and Theodore




L. Thomas' *Weather Bureau* stories give us an idea of what might happen one day, if not which day. We know that parts of the sun are wildly active, throwing out flaming gas for many miles and we know that sunspots are cooler parts, which sometimes follow a regular cycle, and sometimes disappear for decades, but we don't know why.

The Greeks symbolised the Sun as Apollo, driving his fiery horses across the heavens each day giving light and music to the world, but also blinding and killing unwary mortals. Ironic that those tiny points of light we see at night are gigantic suns like ours and doubly ironic that the source of all our life cannot be looked at with the naked eye.

*Next issue – SF books inspired by the outer planets.*

# INSIDE SPACELAB

THE EUROPEAN SPACE AGENCY HAS RELEASED A SET OF SLIDES THAT GIVE SOME IDEA OF WHAT IT'S LIKE TO WORK IN SPACELAB

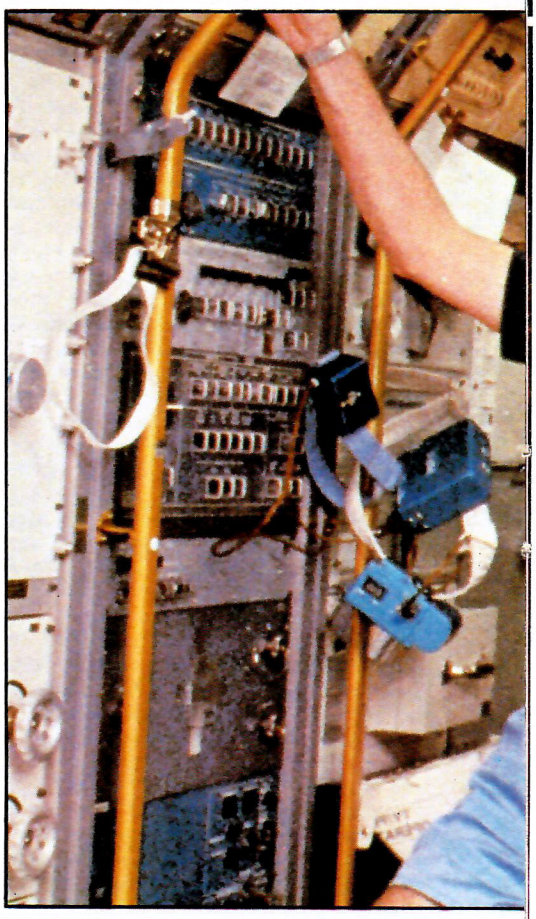
Spacelab's crew working compartment is composed of a pressurised module only 2.7 metres long and 4.1 metres in diameter. And those are the outside dimensions! The module is lined with racks of instruments and the false floor covers life support and avionics equipment, reducing the work-space even further. Fortunately, the system is very flexible, to allow the orbiting laboratory to be custom-built for the particular requirements of each mission. Part of that flexibility allows for two pressurised modules to be linked together as a single crew compartment. Even so, the accommodation is a little cramped.

Spacelab was a hit with NASA. They praised it as one of the most successful space systems they've worked with to date. The Shuttle astronauts certainly liked it. They made use of the access tunnel between the two spacecraft and spent a good deal of their free time in Spacelab. The various American and European pilots, payload specialists and mission specialists must have taken hundreds of photographs of their work and play during the STS-9/SL-1 flight. These few images give some idea of the conditions in which they worked in space.

### Post-Apollo

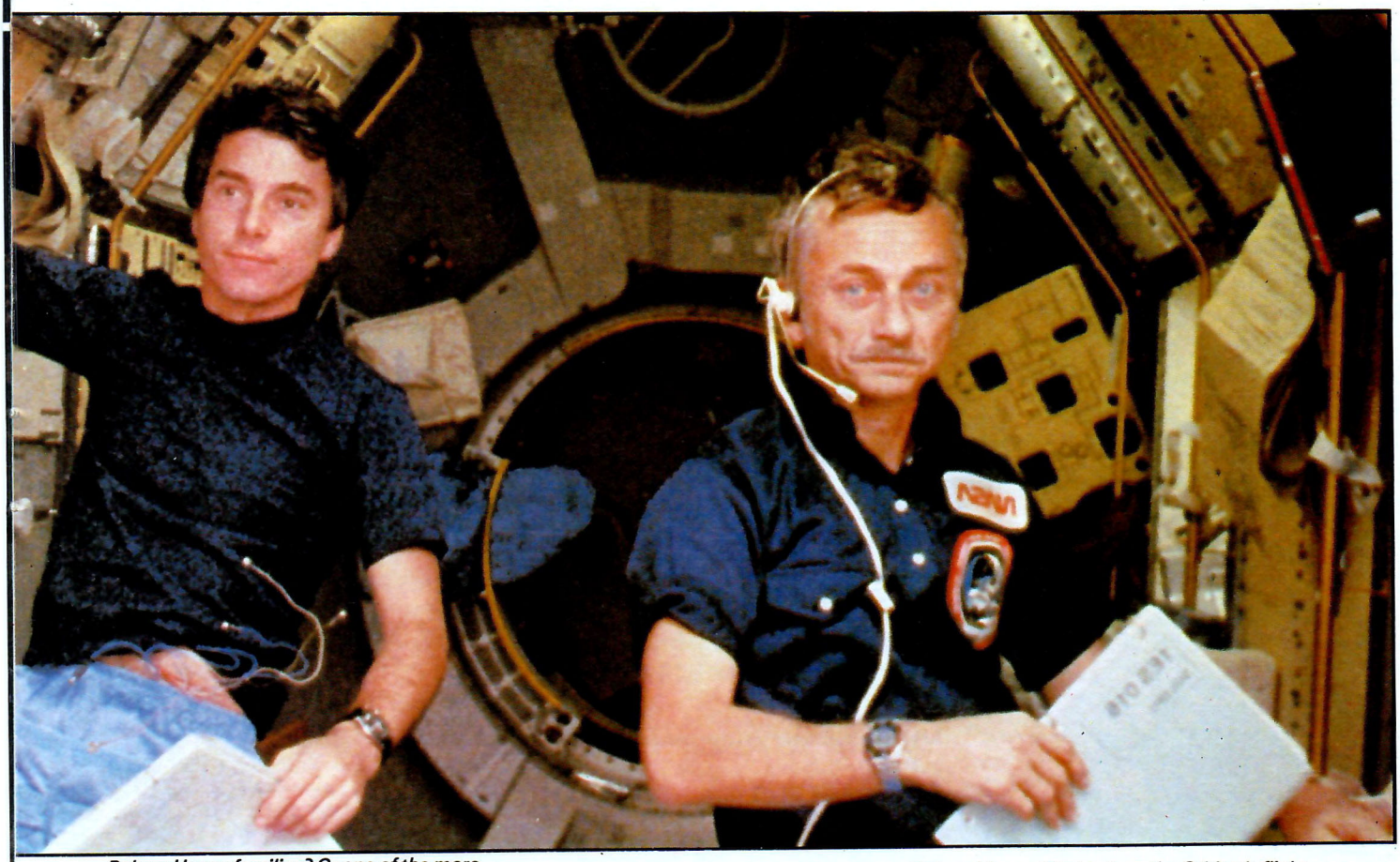
The scientific return from spaceflight is on the increase as a result of sending scientists into space instead of test pilot/astronauts with a little scientific training. Having a scientist on-site is also a great improvement on using remotely controlled or automatic experiments. The scientist on the spot can change his plans to suit unexpected circumstances or follow up interesting observations with unplanned experimental activities.

Spacelab is built with that concept in mind. Its payload specialists do not have to go through the same rigorous astronaut training as the crew members who actually fly the Space Shuttle Orbiter. Here, then, is the crew of Spacelab-1 at work and play.

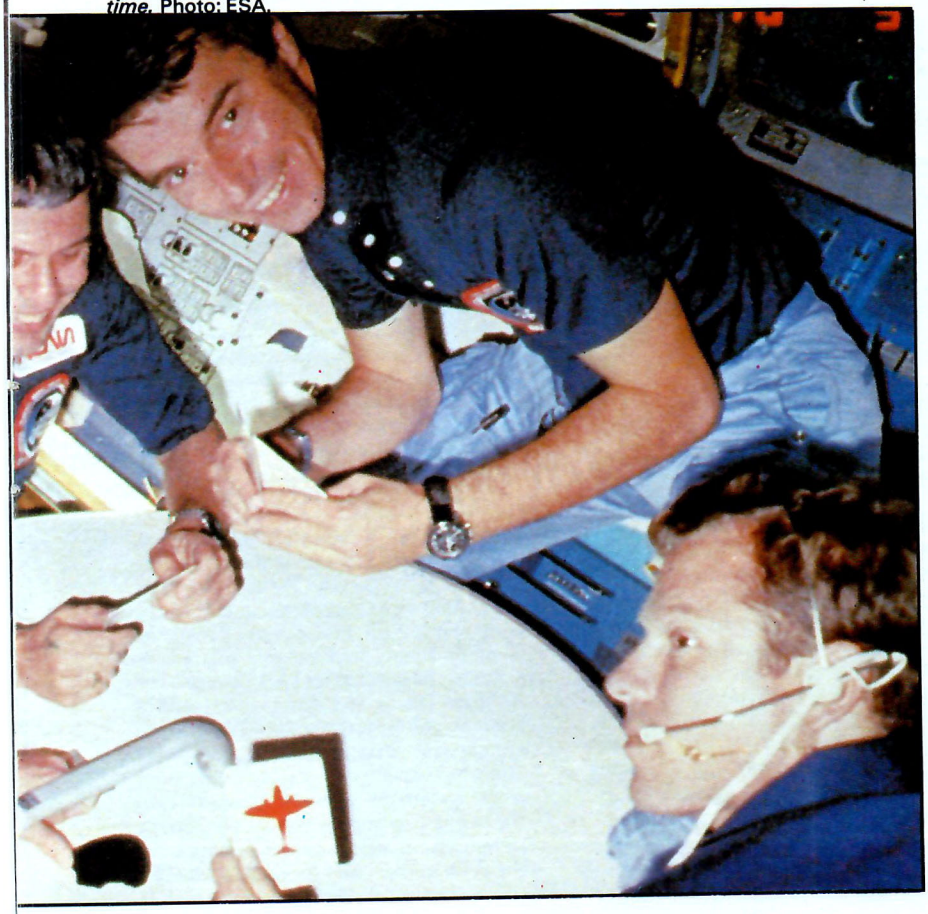


***Above: Ulf Merbold and Owen Garriott get used to working in weightless conditions.*** **Photo: ESA.**

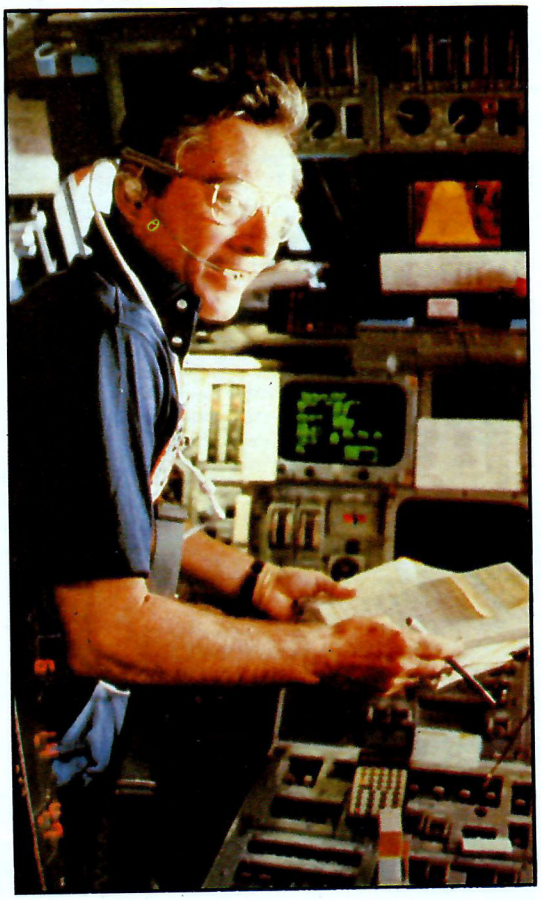
***Byron Lichtenberg slides a piece of equipment out of one of the laboratory's instrument racks.*** **Photo: ESA.**



*Below: Happy families? Or one of the more eccentric experiments? Whatever it was, a photographer was obviously floating by at the time.* Photo: ESA.



*Below: Meanwhile back on the Orbiter's flight deck, there's work to be done. John Young keeps the paperwork up to date.* Photo: ESA.



# SPACE SOC POWER

SPACE ACTIVIST SOCIETIES ARE STEADILY GROWING IN NUMBERS, MEMBERSHIP AND INFLUENCE. FUTURES CONSULTANT ANDREW NIMMO LOOKS AT SPACE SOCIETIES HERE AND ABROAD, WHO JOINS THEM AND WHAT THEIR AIMS ARE

Space society power was first illustrated in the 1970s when the American L5 Society got together with the might of US Star Trek fandom. 60 000 people wrote to President Ford and he changed the name of the first Space Shuttle to *Enterprise*. If Dr Who fans and Britain's space activists, the Free Space & Space Settlers, got together, maybe the same kind of thing could happen here. Trouble is we don't (yet) have a space-time machine we'd like to name 'Tardis'.

Space activism has now made polls on space attitudes common in the States, and space lobbyists abound in Washington. Well over a hundred groups now campaign, ranging from the very small to giants such as The Planetary Society with 110 000 members. In Britain, we have more space societies than many realise. There is a space and/or pro-space science fiction society in almost every university. There are the British Interplanetary Society, ASTRA in Scotland, Free Space & Space Settlers, and a host of pro-space SF groups of varying sizes. Were they, or even an appreciable number of them, to get together and push for space politically by writing to politicians or the media, a great deal could be achieved to push Britain's space effort.

### Society activities

Some dedication is necessary in the activist groups – the more you do, the more chance there is of the society succeeding in its aims. Even so, you are unlikely to be asked to write letters to MPs more than once or twice a year, if that. You will probably be asked to do what you can to recruit your friends, as the more members such groups have, the more attention the media and politicians will pay to what they say. You may also be asked to make phone calls in a phone tree, but probably not more than half a dozen at a time, and again only once or twice a year, but it all depends on you. Space activism is always on an entirely voluntary basis.

### Major British and foreign space societies

### Academic societies

**The British Interplanetary Society,** 27/29 South Lambeth Road, London SW8 1SZ. Under 16 years old, £16 per annum; 16-18 years old £18 pa; over 18, £21 pa. The BIS produces two first class glossy mags, *The Journal* and *Spaceflight,* one of which may be included in your membership fee. If you want both you must pay an extra £20. Twice a year *Space Education* is also produced. This costs £4 extra. The Journal is scientific. Spaceflight is much easier reading, containing space news and features. The BIS also holds formal meetings in London with the best speakers on fascinating subjects. It is not just Britain's but the world's most venerable space society.

**The Royal Aeronautical Society,** 4 Hamilton Place, London W1V 0BQ. The RAeS have an 'Astronautics and Guided Flight Section'. Further details available from the Society.

**The American Astronautical Society,** 6060 Duke Street, Alexandria, VA 22304, USA. The AAS publishes *The Journal of the Astronautical Sciences,* and is of particular interest to those with an engineering orientation.

**The American Institute of Aeronautics and Astronautics,** 1290 Avenue of the Americas, New York, NY 10019, USA. The AIAA publishes *'Aerospace America'* plus archival material. Wide scope and very interesting. This is where you can find out what NASA is likely to be up to soon.

### Less Formal Societies

Work done here is often every bit as academic as in the above section. The difference lies in manner of organisation rather than content.

**The Association in Scotland To Research into Astronautics,** Secretary, William Ramsay, 19 Eastfield Avenue, Cambuslang, Glasgow. Students £2.50 per annum, ordinary members £5. ASTRA holds regular informal discussions and other meetings in Glasgow and other Scottish towns. Non-members usually welcome, but ring a the secretary at 041-641 1108 to check arrangements. This vigorous group also undertakes various projects of an activist nature and some of its proceedings appear in book form. Their Ayrshire branch produces *Space Explorer,* at 20p per copy. Scientific standards are high and membership is a bargain at the price.

### University Space Societies

These can usually be contacted c/o The Secretary, The Space Society of the University of 'X', and the address of the university's students' union. Meetings range from purely social discussions to serious work according to the particular group. Non-students are usually excluded. Membership is small at individual universities, but jointly they have tremendous activist potential.

### Activist Societies

**The Free Space & Space Settlers' Society,** Secretary Chris Forrest, 8 Barton Bridge Close, Raglan, Gwent, Wales. Members £12 per annum, Group Associates £12 pa, Associates £2 pa. FS4 pushes politicians for more space involvement, acts as an unofficial UK fan club for ESA, opposes the UN Moon Treaty, and assists the House of Commons All Party Committee on Space in various ways. Space Settlers is a society within the society with its own long term space settlement scenario. It works with FS4 to improve opportunity for this. Space Settlers' membership is free to members of FS4. All Members and Group Associates – groups such as university socs who wish to

become active and associate with FS4 – receive *Free Space News,* which looks at space from a European space politics angle. Associates, other than Group Associates, receive only an Annual Report and notice of activist actions in which their services are sought. This is to maximise the activist list at a cheap enough rate to suit students, unemployed space fans, etc. FS4 is at present looking for people to form and join branches around Britain, at which informal meetings will take place, similar to ASTRA's but more activist oriented. FS4 is non-party, and Britain's only fully activist-oriented space society.

**Union pour la Promotion de la Propulsion Photonique,** 6 rue des Remparts Coligny, 31810 Venerque, France. Subscription 120 F Fr UP3 is a go-getting special interest group supporting light-sails (sometimes wrongly termed 'solar' sails) for propulsion. They are trying to organise a light-sail race to the Moon as a way of heightening world interest in spaceflight.

**The L5 Society,** 1060 E Elm, Tucson, Arizona 85719, USA. L5 led the way in the development of US space activism. *L5 News* gives up to the moment info on what's happening on the American space politics scene, plus good space coverage. This is the original space settlement society, but its other interests are wide. FS4 in UK and L5 are at present negotiating a relationship.

**The Planetary Society,** PO Box 91687, Pasadena, CA 91109, USA. This enormous society was formed after Carl Sagan's *Cosmos* series. He is president, and while it primarily supports unmanned planetary explorations, it also funds research on asteroids, light-sails etc, and has worked out trajectories for manned trips to several asteroids. *The Planetary Report* tells members what's happening in space and also covers US space politics.

### Rocket Society

**The Paisley Rocketeers' Society,** Secretary, John D. Stewart, 15 Bushes Avenue, Paisley, PA2 6JR. Membership 50p per annum – for those lucky enough to live in the Paisley area. Associate Membership (for non-locals), £1.20 pa. Naturally, meetings take place out of doors. Reports on rocket firings are sent to both Members and Associates. This society fired the world's first successful 3-stage rocket as early as 1937, have developed a water-powered rocket (yes, water!), and engage in a host of activities including rocket mail in aid of charity.

When writing any space society, always enclose a stamped addressed envelope if you want a reply, or in the case of the foreign groups, international postal reply coupons – available from post offices.

### Why join the activists?

It's true that politicians get lots of letters and the odd letter from a space enthusiast is likely to get short shrift. A lot of letters however, from a lot of voters on the same topic, all arriving around the same time, have to be listened to because they might attract media attention and influence more voters. A space activist society has to build up therefore, until able to co-ordinate such events, and it must choose its subject carefully so that it is not merely a nuisance. It can also lobby MPs in the name of its members. This is where larger numbers count. Britain's FS4 is still small. The most important thing space activists can do right now is join, to help it build up.

On lobbying, FS4 has the built-in advantage of having MPs among its members. David Atkinson MP (Con – Bournemouth East) and George Robertson MP (Lab – Hamilton), joint chairmen of the All Party Committee on Space, and Michael Marshall MP (Con – Arundel), chairman of the Conservative Party Parliamentary Space Committee, are all Honorary Vice-Chairmen of FS4.

Space interest is growing in parliamentary circles. There are unfortunately still only a few Labour MPs who realise space is not the waste of money many think, but keen interest is evident in the Alliance. Both David Steel and Dr David Owen are space fans to some degree, and have contacted FS4. Dr Owen was interested in the US Voyager probes and believes it is sensible for Britain to take an interest in space within our financial abilities. Several Conservatives are space fans and so far they are the only party with its own Parliamentary Space Committee. Last year, Mrs Thatcher toured ESA's Dutch research facility (ESTEC). Continuous activity among back-bench space committees can maintain interest, and even build it further if it has support from activists.

*continued on page 74*


*Standard Games Latest Release*

# Samurai Blades

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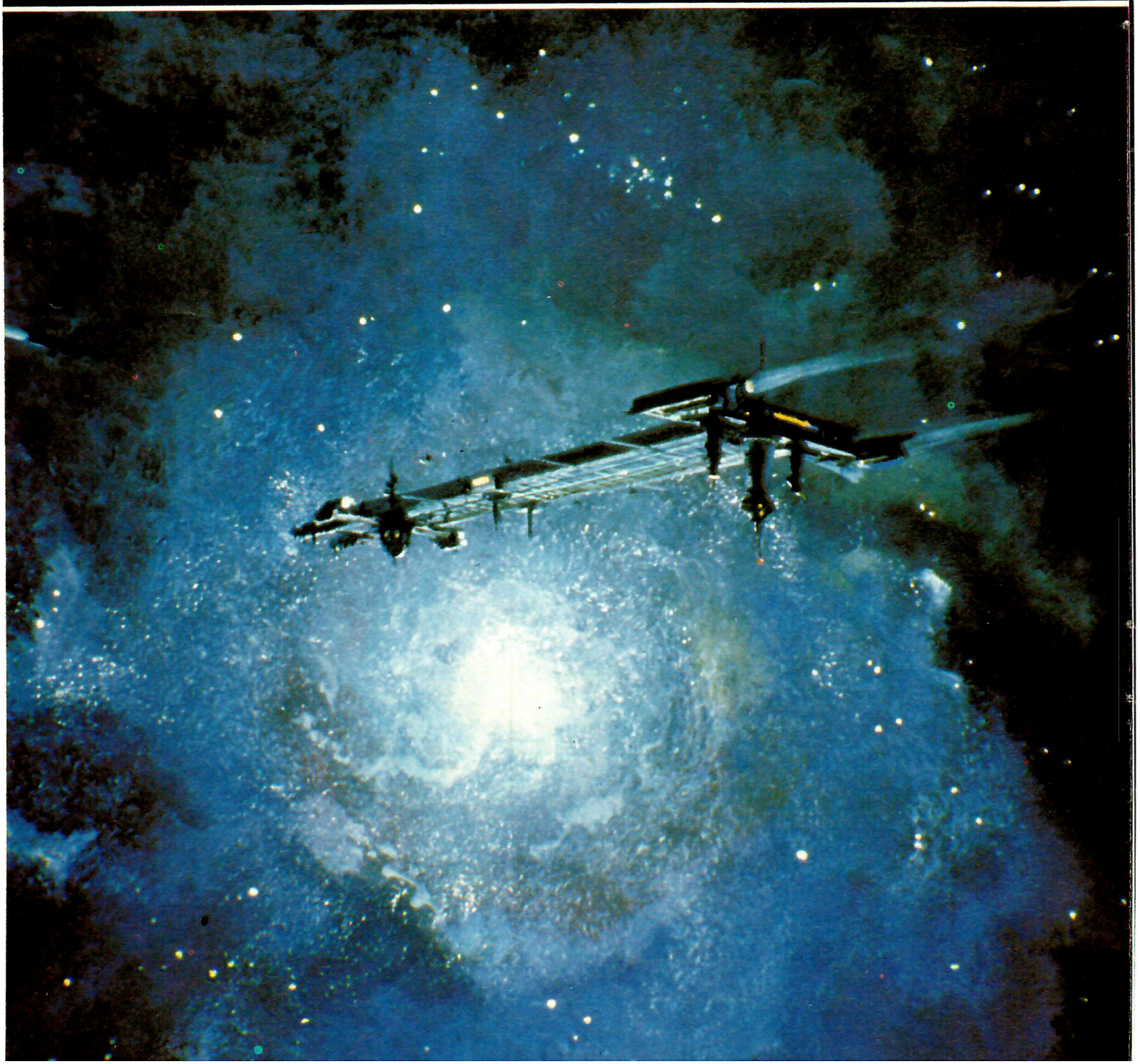
# SPACE FLIGHT

THE STAGGERING RATE OF TECHNOLOGICAL CHANGE POSES OBVIOUS PROBLEMS FOR SF WRITERS. FACT SEEMS TO CONTINUALLY OVERTAKE FICTION. DAVID WILFORD LOOKS AT HOW THE ADVENT OF SPACEFLIGHT IN PARTICULAR HAS AFFECTED SF WRITERS AND THEIR WORK



On July 21 1969, Neil Armstrong took a giant leap for mankind and another fertile theme was lost to SF. Speculation about the moon had been a staple of the pulp magazines and serious science fiction alike but then someone was boorish enough to spoil it all. Around the world, writers tightened their belts and set off for pastures new with a faraway look in their eyes.

And thank the Galactic Spirit for that, I hear you cry. For now the force was with them. They had to either go farther into space to let their imaginations run riot, or delve into the human psyche, or explore the possibilities raised by genuine social trends and problems. This is not to say that writers of Space Fiction (as opposed to the wider field of SF itself) had been unimaginative enough up to this point to confine themselves to merely writing about the moon. Far from it. But now they could see the conquest of the entire Solar system in the not too distant future as a real possibility, and therefore had to expand or become overtaken by facts. The moon was the first to fall, but surely Mars, Jupiter, Mercury and the rest cannot be far behind.

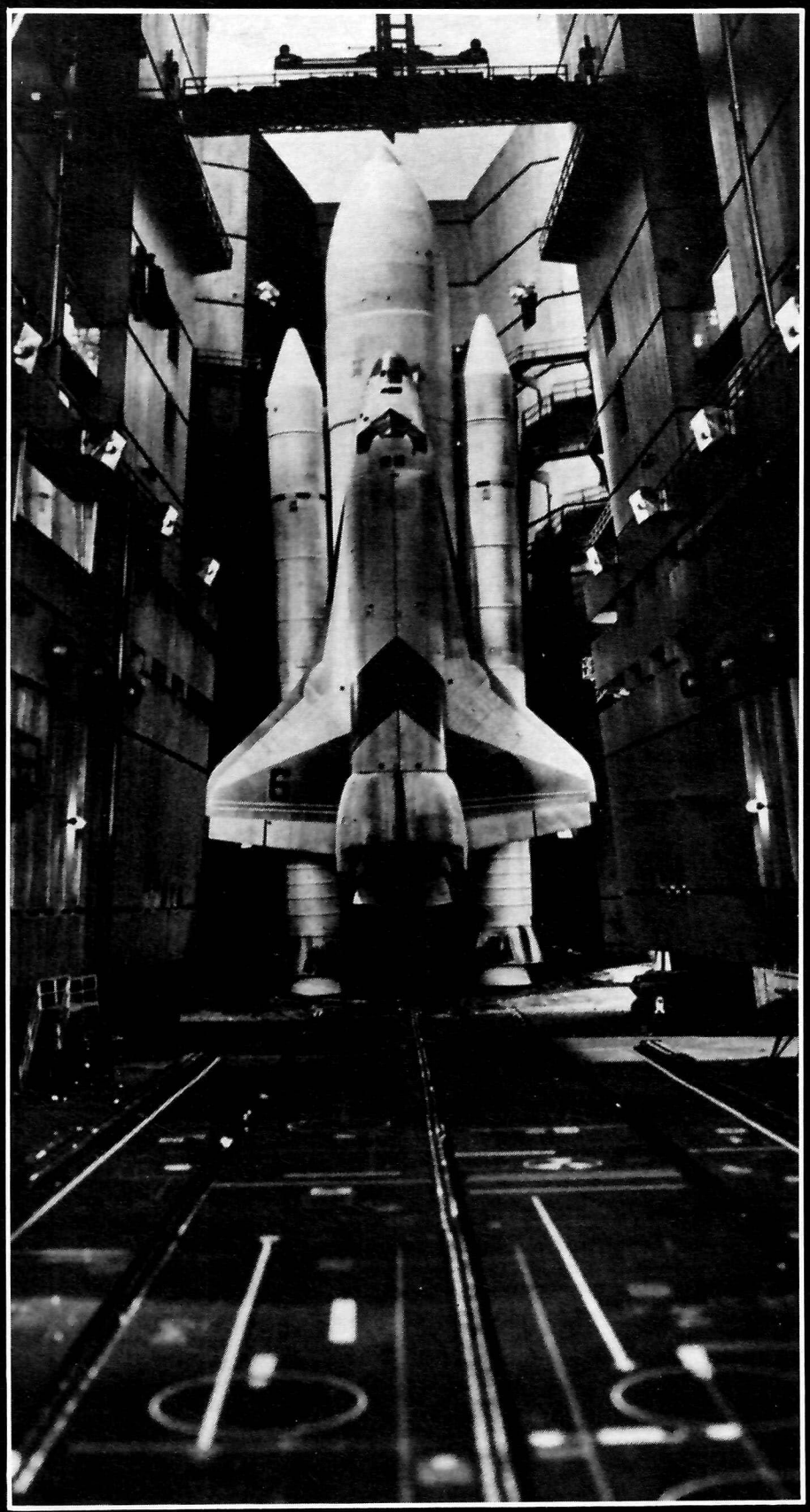
Space Fiction at its least sparkling was no more than a genre composed of adventure stories set in space. The heroes might as well have been cowboys and the green Martians and bloated white Jovians, Apaches or Sioux. Racist adventures, in which the white man overcame countless wild animals and wilder natives had merely been transferred to a less politically sensitive field. After all, it was not very likely that the Martians might ever be given the vote.

This was of course only true of the worst examples of Space Fiction, but such examples were by no means rare. Many was the 'Shoot Out at the OK Corral' that took place somewhere between Saturn and Pluto. Even the very best writers of early Space Fiction, such as H. G. Wells in his *First Men in the Moon,* described with almost savage joy the destruction of vast numbers of moonbeasts or Martians. In Wells' case the reasoning was rather more sophisticated than was generally so, in that the wholesale murder of the inhabitants of the moon (or as he called them Selenites) was more a criticism of the killer than a glorification of the killing. Depressingly often this was not the case. Thankfully, almost all of the 'Space Pulp' written in those early years (between about 1890 and 1930) has sunk without trace. It was not suited for survival. This is partly why most of the SF that has come down to us from those days is of an almost uniformly high standard in a quaint way.

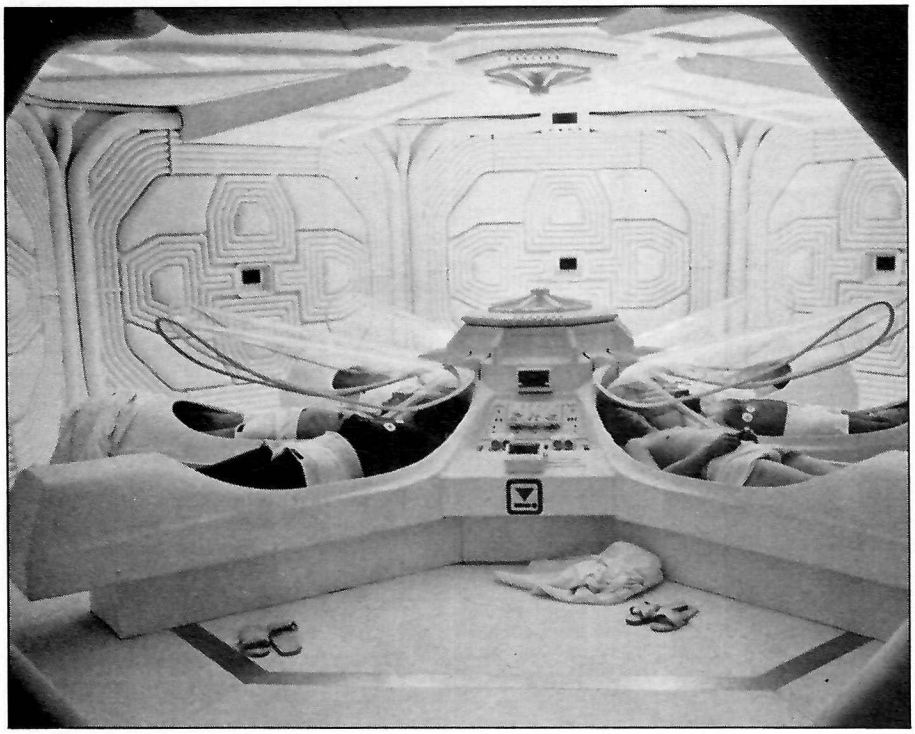
### Positive poles repel

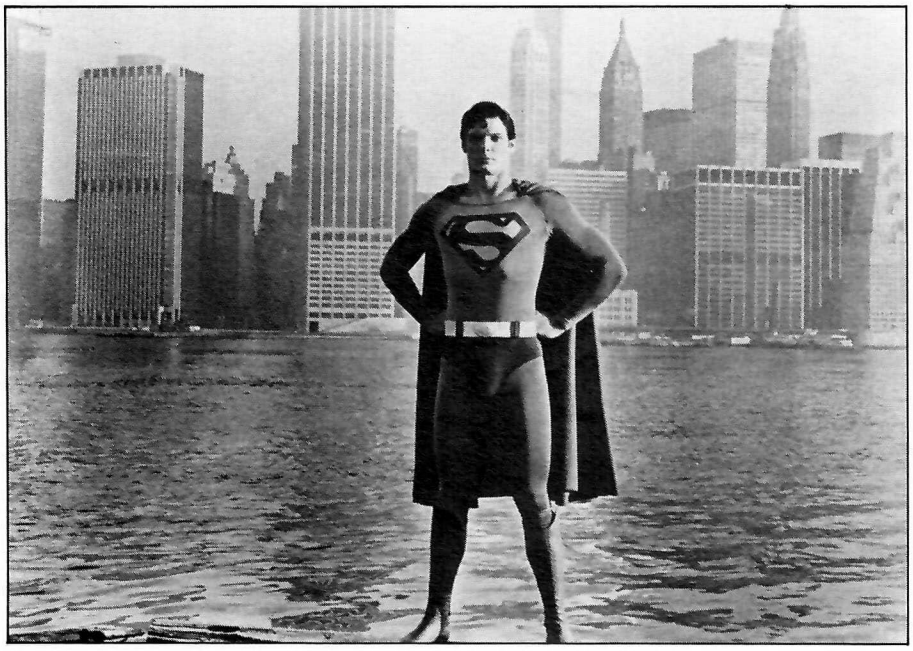
Until the beginning of this century, powered flight itself appeared as remote as space travel. The Montgolfier brothers had conquered gravity many years before in their balloon, so man was no longer entirely earthbound, but he still did not have the ability to choose where he went. He was entirely at the mercy of the winds. This explains the extraordinary method of flight that Wells describes in *The First Men,* a means of conquering gravity by countering it with another force, much in the way that two positive poles of a magnet will spring apart when joined together.

*The First Men in the Moon* was written in 1901. The following year, the first principles of



***Space technology can have a very direct effect on science fiction. The James Bond film,*** **Moonraker,** ***featured realistic space shuttles.*** **Photo: United Artists.**





rocketry were formulated: At last, even though the practical applications of the theory were still many years in the future, the planets were not as remote as they had been.

It was in 1902 that the term 'rocket' began to be applied to something other than a particularly spectacular sort of firework. It was in this year that Konstantin Eduardovitch Tsiolkovski, a Russian schoolteacher, first formulated the theory of rocketry. His work was ignored at the time, yet has proved over the years to be remarkably accurate. Little did Wells know, but his ingenious ideas were shown to be totally haywire in rather less than a year.

Tsiolkovski was a theoretician who never actually put his ideas into practice. This was left to an American, Robert Goddard, who in 1926 launched the world's first liquid fuel rocket. While by all accounts this launch was anything but spectacular, it started the long journey towards Neil Armstrong's small step.

### The SF boom

Of course the SF writers did not hang about.

*Top: Suspended animation, a fictional invention, has allowed writers to get their characters from Earth to the other side of the galaxy without ageing appreciably. Here, Nostromo's computer is awakening the crew from their hibernation.* Photo: 20th Century Fox.

*Above: Science fiction needn't mimic space technology in the real world at all. Fantasy characters like Superman have escaped relatively unscathed by the advance of technology.* Photo: Warner Home Video.

*Right:* Star Trek, *which came to the small screen around 20 years ago, featured a number of futuristic phenomena which were even then based in fact. The* Enterprise*'s photon torpedo/laser bank defences are topical today with our debates on laser space weapons and directed particle beam weapons. Its power plant propels the ship from the huge amount of energy produced by the annihilation of matter and anti-matter. The shape of the craft itself was something of a triumph by Gene Roddenberry over the American television networks who favoured the archetypal cigar shape.* Photo: Cinema International Corporation.

This was the dawn of SF's golden age, when magazines, such as *Amazing Stories* (which was also launched in 1926 – coincidence?) came to the fore. SF, formerly the speciality of the few, became a boom field. There were enough stories to fill four or five publications every month. They were a watershed for a great array of talent, particularly in the late thirties. Such people as Asimov, Clarke, van Vogt, Heinlein, Anderson and Sturgeon all owe their success to these magazines and to one man in particular – John Campbell.

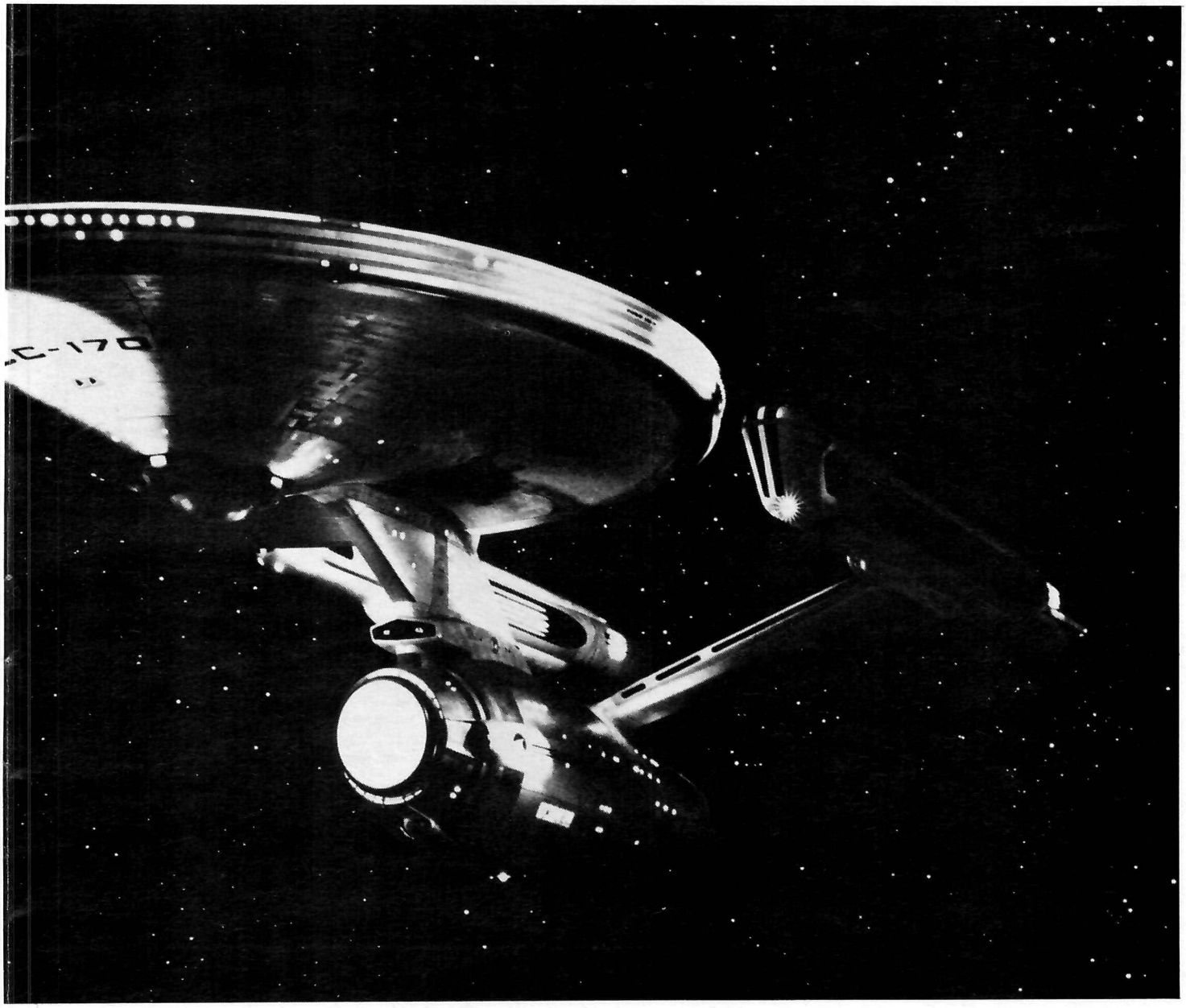
Throughout the thirties, Campbell had been one of the biggest names in SF. He wrote stories that were accepted by all the magazines, based on the then common themes of giant robots, mad scientists, galactic empires and the rest, all written in a basic, raw style. In 1938 he became editor of *Astounding Stories,* which he immediately retitled *Astounding Science Fiction.* He was as sick as many of the readership were of having the SF sphere confused with other elements of adventure fiction. The change in title of the mag was only the first step. What he really wanted to do was to make SF accepted by a more serious audience and in particular by a *scientific* audience. He therefore axed many of those writers who had thrilled a less sophisticated readership and set about trying to set up a stable of writers who could write fiction as though it could be fact. Single handed, Campbell changed the face of SF.

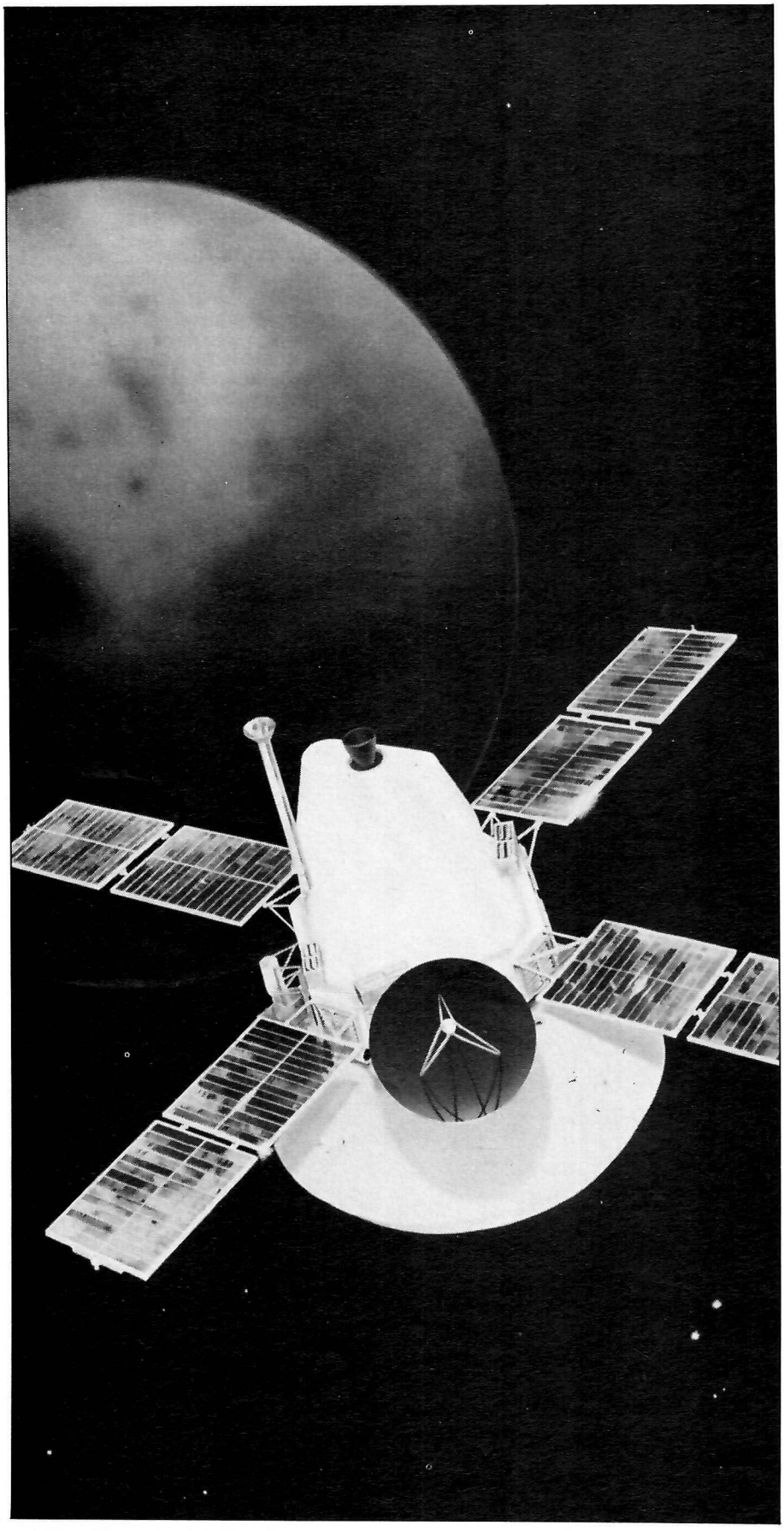
He found many young writers, many of whom I have already named, who became central to a whole generation of SF fans. Campbell guided the likes of Clarke and Asimov until they were writing the sort of thing he liked, and it is testimony to his perception that these writers are still among the most widely read SF authors today, nearly 50 years later.

## The War factor

Then came the War. Science always progresses faster during a war than at any other time. The V2 made its appearance. This was the first rocket to be put to any practical use and it stunned the world. Rocketry grew so fast during the War, that it is unlikely that Man would have got to the moon in 1969 but for it. Wernher von Braun's design for the V2 was used by the Americans after the war as the basis for the first Step-Rockets, composed of various stages, and originally provided the only way of projecting a capsule large enough to carry a man out of the Earth's atmosphere.

Getting a man into space and then onto the moon became a major preoccupation of rocket developers all over the world, but particularly in the USA and the USSR. SF writers turned their thoughts towards trying to predict both how and when Man would first tread the moon's surface. On the whole the only predictable thing about these predictions was that they would be years wide of the mark, on the side of caution. But who can blame them? Was it really feasible that a mere 12 years after the launch of the first satellite (Sputnik 1 in 1957), two Americans in ludicrously baggy space-





*The Mariner and Viking (shown here) spacecraft ended much of the age-old controversy about Mars and the question of life on its surface that had fuelled the imaginations of writers over the years.* Photo: NASA.

suits would be tripping the light fantastic in the Sea of Tranquility? Of course not.

Perhaps the one man who came nearest to the mark was Robert Heinlein, who in 1950 predicted that not only would interplanetary travel be possible by the end of the century, but also that it would be widely and cheaply available. Nor was this a claim in a work of fiction, but a serious belief stated in an essay called *Where To?* Admittedly, it does not look as though his belief will prove to be true, but it is the thought not the fact that is important. The fact remains that this could have happened had there been enough money. Heinlein's statement is remarkable because at the time Sputnik was still seven years away and the name of Yuri Gagarin wasn't to become known in every household in the developed world for another eleven. And anyway, who knows? The scientists still have another 16 years (almost) to get their act together.

It is sad, is it not, that 15 years after the first moon landing, there has been no serious attempt to land a man on Mars. That was the one thing that Heinlein could not predict, that governments would continue to spend enormous amounts on defence and other such pointless extravagences, when it is becoming more and more obvious that in the fairly near future one planet alone will not be big enough for humanity. The SF writers recognised it years ago; that our future lies in the stars – and not in the way that astrologers mean!

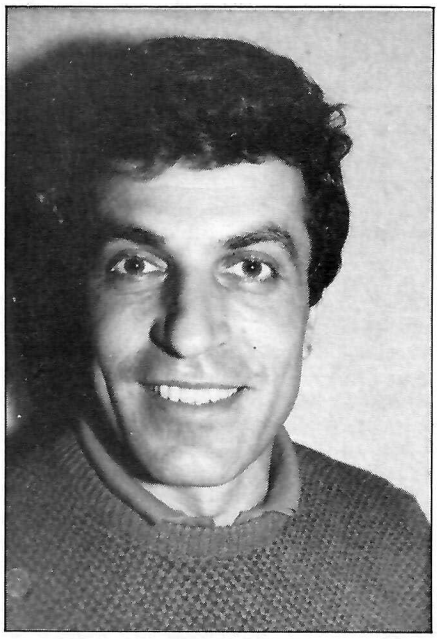
## Man in space

Sputnik presented no real problems for the SF writers. It created a larger audience out there for them, since the curiosity and imagination of the public was fired by this spectacular scientific achievement. And anyway, the writers could still hypothesise about what might happen to a *man* in Space. Many heroes of novels lost the power of thought, were captured by moon men, Venusians, Jovians, Martians, Mercurians – and even by all of them at the same time! But then Vostok 1 was launched on April 12, 1961. Gagarin came back totally unaffected by his experience. The public would no longer swallow ideas about Space being incompatible with man. Now SF heroes had to land, perhaps to find something strange. Then Armstrong landed.

The story of Space Flight has been a short and glorious one extraordinarily interesting. However the reality of it does not lend itself to SF. It is far more gripping as fact than it is as fiction. It is therefore still valid to try to see far into the future, to see the uses to which the ability to explore Space might be put – mining the asteroid fields, settling new planets, etc. But the Space Ships themselves, or the fact that a story is set in Space is no longer enough. The whole world has witnessed miracles of technology; Skylab, the Voyager craft, the Apollo series – most people are pretty blasé about it all these days. Obviously the occasional thing happens that would have made a wonderful SF story – the near disaster of the Apollo 13 mission, the unfortunate loss of two very expensive satellites on a recent Space Shuttle trip. To most of us, this is all as exciting and interesting as the product of the most fertile brain of any writer – but spare a thought for the SF authors. They've somehow got to keep ahead of scientists and with things progressing as fast as they have in the second half of this century, that is by no means easy.

# THOM CHRISTOPHER

WENDY GRAHAM INTERVIEWS THE HAWK MAN FROM BUCK ROGERS FOR SPACE VOYAGER



High heels, black tights and feathers seems to be a strange recipe for fame – especially when worn by a man, but when the occupant of the costume was Thom Christopher the effect was magical.

Thom is one of those rare people who is endowed with more than his fair share of charisma, and that, together with his great talent as an actor turned what could have been cartoon character time at Buck Rogers into a performance which has firmly etched itself into many people's memories.

He is also to be envied as an actor in that he is much in demand – he walked straight out of the movie studio after doing an episode of T J Hooker to the airport to fly to Empathiccon in Liverpool where we talked before he went on to London and then back to the States to take on more parts.

Thom is a delightful person to interview, with a compelling ability to focus intently on the person to whom he is talking. His enthusiasm for his work and life makes most people seem lethargic and dull. He is a voracious reader and when time permits a keen attender of theatre and cinema.

'As soon as I get a pay cheque I'm off to the bookshop or the record shop spending. At our New York home we have two rooms just full of books and records. I even read while I'm watching TV.'

'My favourite reading material is biographies and theatrical history and science fiction.'

'When I was younger, in my early twenties, say, I read much more fiction, but now, as I get older, I find I have a thirst for knowledge which leads me much more to factual books.'

'It was coming to conventions which introduced me to the world of SF. I feel so honoured to be sitting with Anne (McCaffrey).'

His interest in SF and friendship with Anne has led Thom to start thinking of creative writing himself and to hope for a directing assignment soon.

'I keep on dropping hints in the right ears and hoping,' he said. 'I would absolutely love to see the *Ship Who Sang* produced and oh for a chance to direct it.'

Thom had always wanted to be an actor even as a very young child. 'I can't remember a time when I didn't want to go on the stage. My mother was incredibly supportive, even though my background was against going into something like that. I took dancing lessons right from being very young and went to the New York School For The Performing Arts – the *Fame* school.'

'Where I grew up in New York – I'm an Italian Yiddish Gentile New Yorker (!) – I was a sort of gentle gopher for the orthodox jews of the neighbourhood – I used to run all their errands for them on their sabbath – 25 cents to turn on a light and so on. I did that from about age seven to 12.'

'I worked hard at my dancing lessons and I've done dancing and musicals on stage since. I try to keep fit, I'm very body oriented, I jog, play raquetball, swim and try to keep agile.'

Thom put much of this energy into the part of Hawk.

'Buck Rogers was a season and a half flop really.' 'Hawk was only in for 13 weeks and had only three big shows to make an effect. I did the job, played the part to the best of my ability – and it was a marvellous part – and then was very pleased when I learned that people had been moved by it.

'And when I got the first invitation to a convention I reacted 'Me! Why!?,' but I went along and loved it. The feedback was wonderful. I had tried to make the bird man real – and what a concept to make real . . .'

'And now the fans at conventions know me as Thom as much as they do as Hawk, which is good because acting is ephemeral, a crazy profession.'

Thom's hero in life is Lawrence of Arabia. He has devoured every book available on the man and once sat for four hours in our National Portrait Gallery staring at the painting of him.

'And I've seen the Peter O'Toole film 43 times! I've been haunted by Lawrence for years and since I first saw the film 20-odd years ago I've always thought it the most perfect film ever made.'

Our interview closed with Thom passing on a quotation which he holds in high regard and to which he aspires:

'Whatever is created subconsciously is accompanied by a discharge of energy which has an infecting quality. This ability, the subconscious carrying over of the subconscious to the spectator is a characteristic of talent. Whoever perceives subconsciously and subconsciously expresses it, that one is a genius.'

And as a footnote, Thom was going to London to talk about a part which would have kept him and his lovely wife Judith in this country for 35 weeks and promised he would ring and let me know how negotiations turned out. Actors are notoriously bad at making promised phone calls, but Thom rang (though the deal didn't work out).

# PRODUCTS

### Bandai Xabungles

The Bandai range of Xabungle kits was announced in Products some time ago. Now, Jones Models of Chiswick have supplied *Space Voyager* with two of the kits for evaluation – the Walker Machine Gallop Type and the larger Walker Machine Ottrich Type.

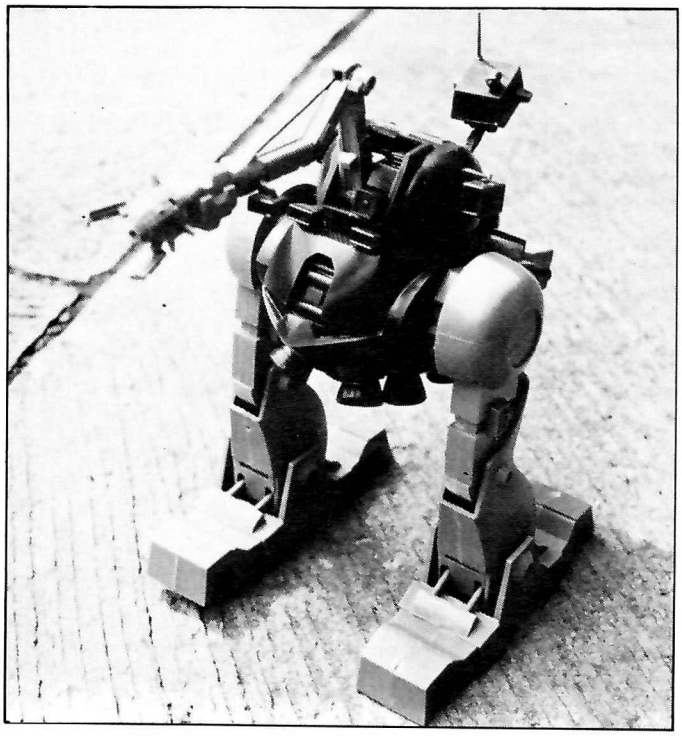
Although all the building instructions for the smaller kit, and presumably some of the other products in the range, are largely in Japanese, their pictorial nature makes them readily understandable without the benefit of text. The larger model was supplied with English instructions. The full colour front page of the instruction leaflet shows some interesting suggestions for painting schemes, more so in the case of the smaller model.

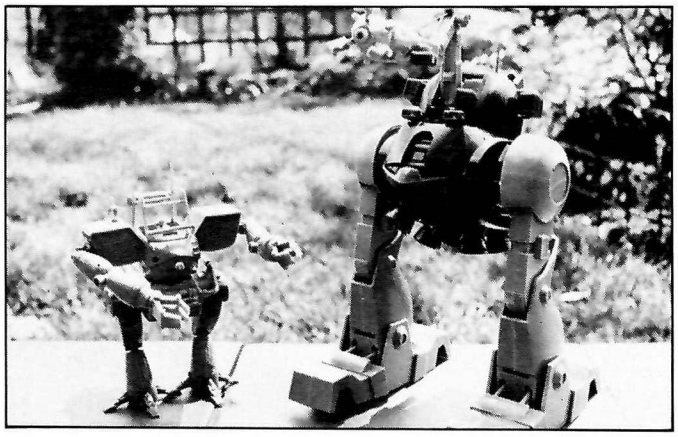
Construction is very straightforward. The only point you have to keep in mind is that these kits feature lots of moving joints, so in many cases not all of the plastic parts in each sub-assembly are glued together. However, these are indicated in the instruction sheet by a broken line linking the unglued parts and a solid black line linking the glued parts. It's quite clear which are which even when the instructions are in Japanese. Also, when you have the parts in your hand, it's perfectly clear which mustn't be glued together in order for a joint to articulate properly.

The smaller Gallop Type machine is described as a 1/100th scale model of a fighting machine that stands 7.8 metres high, making the model almost eight centimetres (three inches) high. Its claws rotate at the wrist and its elbow, shoulder, hip and knee joints bend. In addition, the top half of the body rotates like a tank turret on the bottom half.

The larger model, the Ottrich Type machine (do you think this might be a mis-spelling of Ostrich?), is a 1/144th scale model that stands 14 centimetres (5 inches) high. Although the height of the 'real thing' isn't given, it would at this scale stand over 20 metres (65 feet) high! Instead of the Gallop Type's rotating claws, this model has a spinning drill on the end of a crane-like assembly, which can be raised and lowered. The head turns, even more like a tank's turret; a cockpit on the rear of the head rises and falls and a twin-barrel gun on the back turns. The hips, knees and ankles also articulate.

These two models and all the others in the Bandai Xabungle range can be supplied by Jones Models and other good model shops.





### Build a Dalek

Dr Who fans will be pleased to hear that a foot high plastic construction kit of the notorious Dalek is on the way. Due for release around June/July 1984, the kit is the brainchild of model-maker turned businessman, Stuart Evans.

Mr Evans has told Space Voyager that the kit is an exact one fifth scale model, standing 320 millimetres tall (just over one foot), and reproduced to the original BBC blueprint. Every measurement and angle has been copied from the original BBC full-size machine.

The kit will comprise around 80 parts, mostly pre-cut vacuum formings with detailed parts produced by injection moulding. But it isn't just a single kit. You have a choice of building one of several Dalek variants described on the instruction sheet. Interior details are also included in case you should wish to produce a cut-away or battle-damaged effect. Painting instructions give details of the Humbrol colours required to give an authentic finish.

And now the nitty-gritty – the retail price should be around £12. Look out for further details of this model in future issues of Space Voyager. We hope to publish a full review with ordering and availability details soon.

### BBC Beasty

If you're at all interested in robots and you own a computer, sooner or later you'll want to try to do some practical experiments, like getting the computer to switch motors on and off. Connecting a computer to the outside world can be a hazardous pastime. If you have no experience of electronics construction or computer interfacing (confused already?), you may end up getting bogged down in the electronics needed to link the computer to its surroundings safely. At worst, you might destroy the computer by letting stray and possibly harmful voltages get back into the system.

Enter the Beasty. If you're a sensible computer user – that is, you own a BBC Micro Model B! – the Beasty makes robotics experimentation a whole lot easier and safer (for the computer). It's a small box of tricks that sits between the computer and a series of servos (not included with Beasty) and it comes with software (programs) to allow you to control the servos from the computer under either keyboard or software control. The servos might be the shoulder, elbow, wrist and hand position controllers on a small robot arm.

Beasty's supplier, Commotion (Computer Operated Motion), is about to launch a robot arm to complement Beasty, which will work with between one and four standard Futaba radio control servos. For further information on Beasty, contact Commotion, 241 Green Street, Enfield, Middlesex EN3 7SJ. Telephone: 01-804 1378.

# BEATTIES

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**CARDIFF** Northgate House, Kingsway, CF1 4AD. 0222 397645
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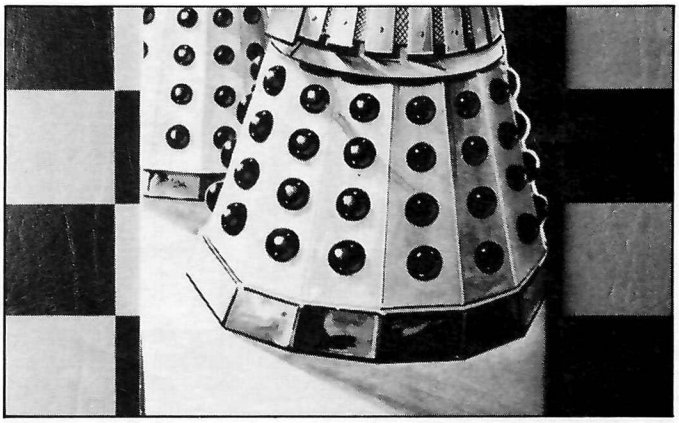
**NEWCASTLE** 43/47 Pilgrim Street, NE1 6QE. 0632 324161
**NOTTINGHAM** 3 Mount Street, NG1 6JW. 0602 411693
**ROMFORD** 7/11 High Street, RM1 1JU. 0708 24283
**SHEFFIELD** 38 Pinstone Street, S1 2HN. 0742 77864
**SOUTHAMPTON** 114 East Street, SO1 1HD. 0703 24843
**WATFORD** 70 The Parade, High Street, WD1 2AW. 0923 27563

*MAIL ORDERS TO SOUTHGATE


### Dr Who tiles

The Sheffield Space Centre specialises in science fiction and fantasy memorabilia and the paraphernalia of fandom – books, magazines, comics, caps, face masks, etc. The latest addition to their extensive range of products is a set of nine ceramic tiles. No, they're not going into the bathroom fixtures and fitting business. The tiles show Tom Baker as Dr Who flanked by the Tardis and a gaggle of Daleks, with the Dr Who logo across the top.

The scene is in full colour and you make it up rather like a jig-saw by putting the tiles together in a three by three square in the correct order. The completed scene is 18 inches by 18 inches (each tile – 6 × 6 inches). If you've already tiled your bathroom, you might add a few plain white ceramic tiles to them and make a tiled coffee table with a Dr Who insert. The set of nine Dr Who tiles is available from the Sheffield Space Centre for £14.95 plus £3.00 postage. For further information about the Centre's products, contact The Sheffield Space Centre, 485 London Road, Heeley, Sheffield S2 4HL. Telephone: (0742) 581040 (don't call on a Wednesday – they're closed all day!)



# BRITISH SPACE SHUTTLE

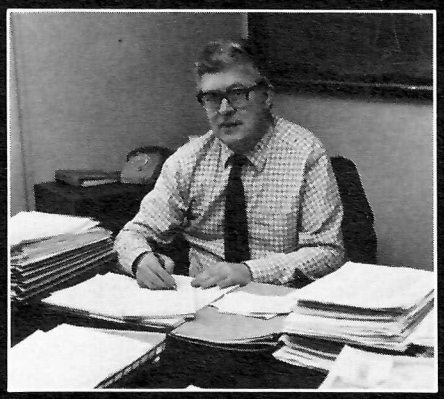
TWENTY YEARS AGO, LONG BEFORE ENTERPRISE, COLUMBIA OR CHALLENGER WERE EVEN A GLEAM IN A DESIGNER'S EYE, BRITISH RESEARCHERS DREW UP PLANS FOR A HOME-GROWN RE-USABLE SPACE SHUTTLE. ANOTHER TALE OF BRITISH GENIUS UNFUNDED? WENDY GRAHAM REPORTS ON THE **MUSTARD** PROJECT AND ITS LEADER, TOM SMITH.

Tucked away in a Portacabin office filled with models of aeroplanes in a corner of British Aerospace's Warton Aerodrome is a man whose trumpet has for too long remained unblown. So at last Space Voyager is introducing Tom Smith to wider recognition as the man who 20 years ago headed a team which produced full plans for a British Space Shuttle – plans which in many ways are still superior to the present American Shuttle.

Tom Smith is an unassuming man who one colleague described as *'the most brilliant aerodynamicist in this country today'* and he and his team produced the plans for MUSTARD (Multi-Unit Space Transport and Recovery Device) some years before the Americans had got round to thinking of a re-usable space transporter. In the early sixties the Ministry of Aviation gave the then British Aircraft Corporation a contract to study Hypersonics. The Corporation formed a team at their Warton Airbase in Lancashire, near Preston.

*'We started by looking at things which were Concorde-ish in nature and went from there to high speed aircraft which would travel at Mach 12 (12 times the speed of sound), with a detour for ramjets as well'* said Mr Smith.

*'We gradually realised that we could go from air-breathers, which would stay in earth's atmosphere, into space. When we started on this line of thinking we laid down that our two main design constraints had to be – how much did we want to put into space (the payload) and how much will it cost? Rockets then had chemical propulsion and were one-off shots. It cost a great deal to get something into orbit, and most of the components were simply thrown away while doing that.'*



***Tom Smith, team leader of the still-born British Space Shuttle.*** **Photo: British Aerospace.**

Mr Smith paid tribute to his team, which numbered about 30 at its peak, with a core of about eight members. *'All were brilliant – very much lateral thinkers. I've always regarded working on MUSTARD as one of the more enlightening experiences of my career.'*

*'As soon as we had decided that cost was a major factor, we started to look at re-usability. Using the airbreathing designs we had and adapting them for space was like trying to turn a submarine into an airplane so that was out. Firstly, we decided, you have to get out of the atmosphere very quickly. We looked at launching a second stage rocket from a modified aircraft but that was not cost/payload effective and so went on to first thoughts on a vertical take-off lifting body.*

*'The first design was for something with two stages, where one was stacked on top of the other. The lower stage was the booster and the second went into orbit. But two different designs for the two stages made it expensive and the lower stage was not very controllable for recovery. Out went all pre-conceived ideas that one stage had to be on top of the other. We put three units side by side. The three units would take-off vertically, two would be rocket boosters and the third would go into orbit. The advantages were that you could have all three motors firing at once for a powerful and efficient take-off and with three identical components from the outside costs would be so much lower. Plus fuel from the two boosters could also be pumped through to the orbiter so that on seperation it would still carry a full fuel load even though its motor had been operating right through take-off.'*

Each MUSTARD component ship would be a bit like the Atlas rocket – a sort of braced balloon which held its shape because of its internal fittings, which could easily and cheaply be changed to fit various missions and roles, and which would have got better and more effective the bigger it was. Each of the three components was much bigger than Shuttle, and nothing was scrapped or discarded.

The two booster sections could easily be recovered – either flown back to a base on separation by a pilot or remotely, to land, be refueled and take off again, as could the orbiter.

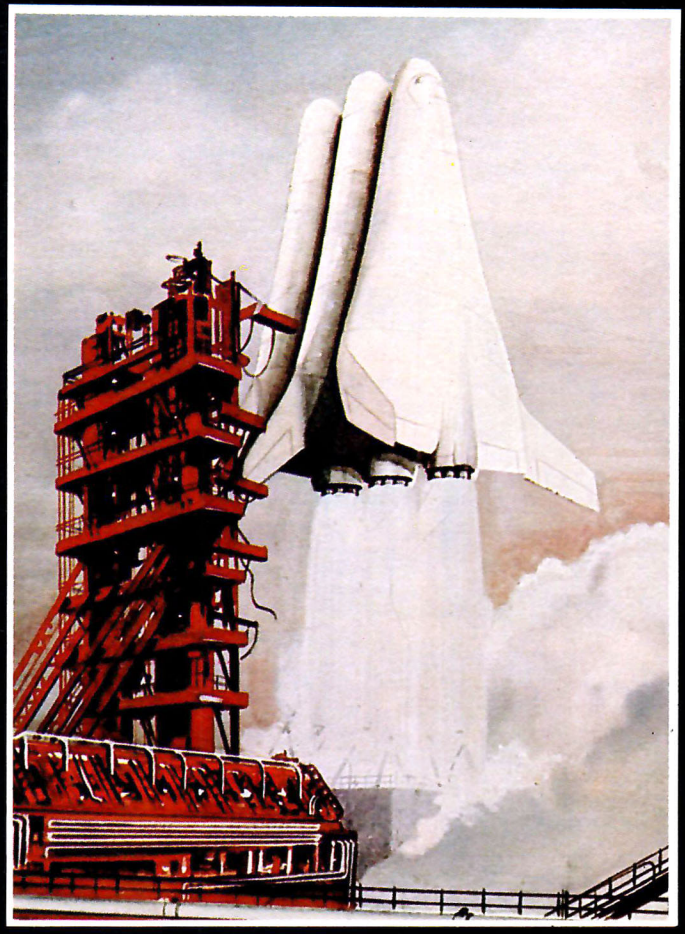
**continued on page 74**

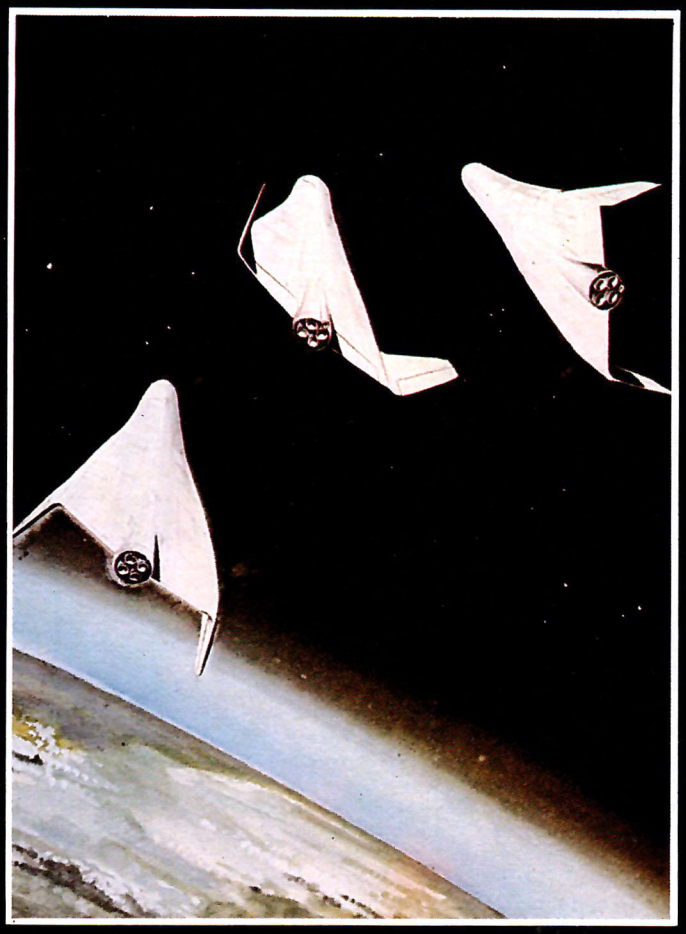
***Launch, with all motors burning. First stage cut-off occurs 150 seconds from launch, at a velocity of 6,600 feet per second at an altitude of 30 nautical miles.*** **Photo: British Aerospace.**

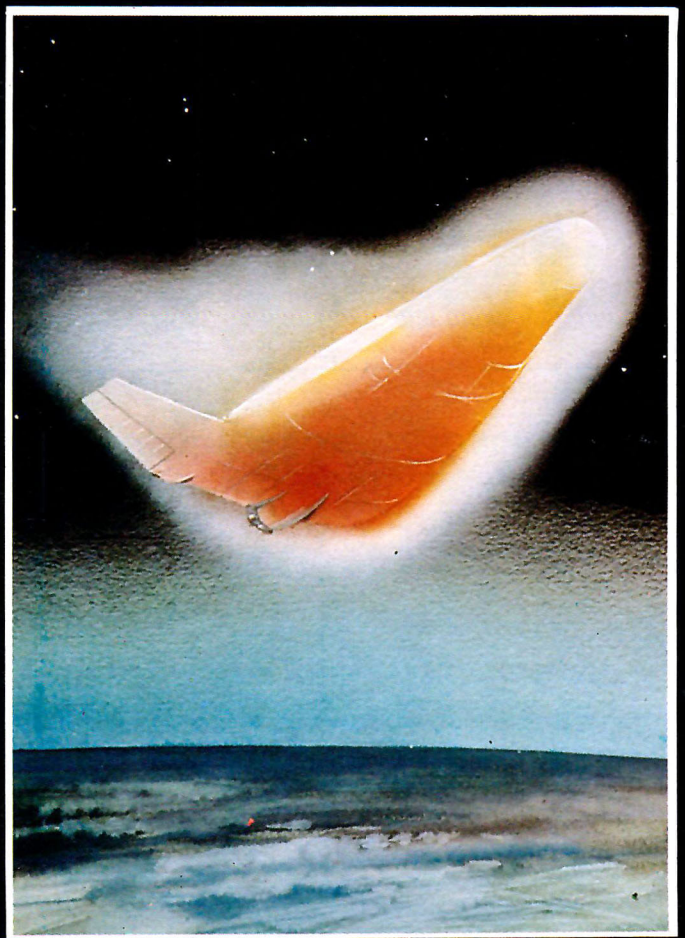
***During a short coast phase, the vehicle connections are released. The spacecraft relights its main motors and achieves parking orbit at 1,000 nautical miles and ten minutes after launch.*** **Photo: British Aerospace.**

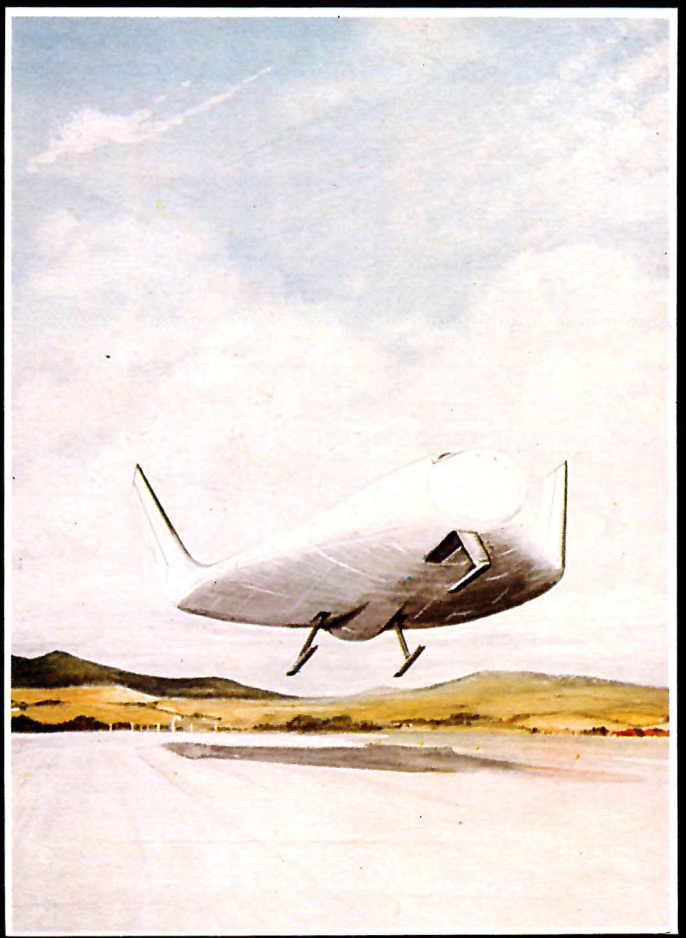
***Re-entry is initiated 11,000 nautical miles from landing. The spacecraft enters the atmosphere 5,000 nautical miles from landing. The hypersonic lift/drag ratio of 1.0 gives a footprint width of 1,360 nautical miles.*** **Photo: British Aerospace.**

***During re-entry, the peak heating and maximum G force of 5.1 occur 270 nautical miles from launch. Following the 300 nautical mile subsonic fly-back, the booster lands at 100 knots.*** **Photo: British Aerospace.**









All of the games programs featured in MICRO WARS should be readily available either from your High Street software shop or direct from the supplier, whose name, address and telephone number is given at the top of each review. Most of these programs sell for £5 to £10 and unless otherwise stated they are supplied on tape cassette. Check with the computer specialist press or the suppliers themselves for the up-to-date situation on prices, stockists and availability.

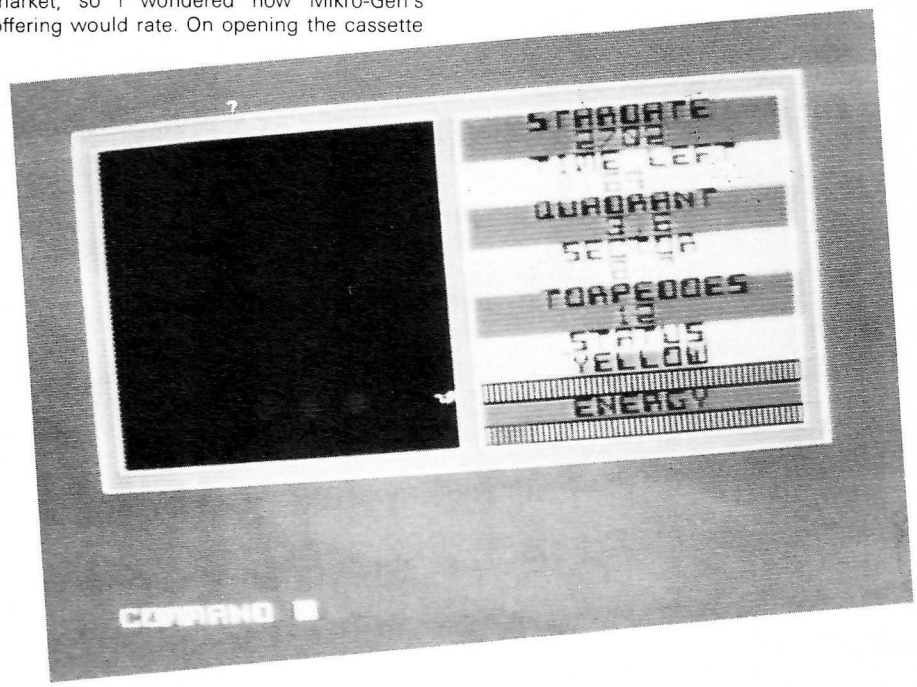
**Title:** Jet Power Pack
**Micro:** BBC Model B
**From:** Micro Power Ltd
8/8a Regent Street
Chapel Allerton
Leeds LS7 4PE
Tel: (0532) 683186
(0532) 696343

You're an astronaut incarcerated in a large space garage by the evil Nogrob The Terrible. On one side of the garage, starships await a fresh fuel supply. On the other side, fuel pods are stored. Your job is to jet across to collect the fuel using your jet backpack (topical!) and return it to the starships. Of course, there are obstacles – the edges of different levels of the multi-layered garage are electrified (to a fatal degree). Little green monsters rise and fall along open columns – if you collide with one, you're dead. The ceiling (if there is such a thing as a ceiling in space) is studded with electrified prongs.

The game is wonderfully frustrating and the five different levels of difficulty should keep you occupied for he foreseeable future. There are keyboard and joystick options. Graphics are excellent and full sound effects are featured, although, to be honest, learning to control my 'Jet Power Jack' of the title consumed so much of the editorial concentration that I can't actually remember hearing the sound effects. Good game, beautifully presented.

**Title:** Star Trek
**Micro:** Sinclair Spectrum
**From:** Mikro-Gen
24 Agar Crescent
Bracknell
Berkshire
Tel: (0344) 427317

There are lots of Star Trek programs on the market, so I wondered how Mikro-Gen's offering would rate. On opening the cassette




case, a tiny booklet fluttered out – The USS Enterprise Captain's Log and Operating Manual! A nice touch. The Enterprise has almost a dozen controls (not bad for a starship!), each selected by typing two or three letters on the Spectrum's keyboard, so it takes a few dry runs to get the hang of the game without constant reference to the operating instructions.

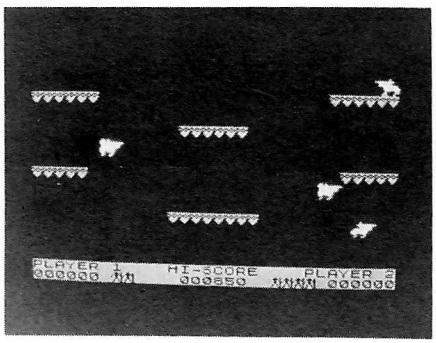
The storyline will be familiar – those video nasties, the Klingons, are storming around the galaxy causing all manner of mayhem and you have to stop them. When they attack the Enterprise, they can knock out your short range scanner, sub-space radio, computer, etc. An over-enthusiastic attack from the Enterprise can temporarily drain its energy cells. A scouting orienteering badge might come in useful for navigating round the galaxy, which is divided into numbered sectors.

On loading the game, a novel and attractive title frame appears. Perhaps because there are so many controls and navigation to become accustomed with, the game is an attention grabber for longer than many others. Good use of colour on a clear and well planned display.

**Title:** Winged Warlords
**Micro:** Sinclair Spectrum
**From:** CDS Micro Systems
10 Westfield Close
Tickhill

# MICRO WARS

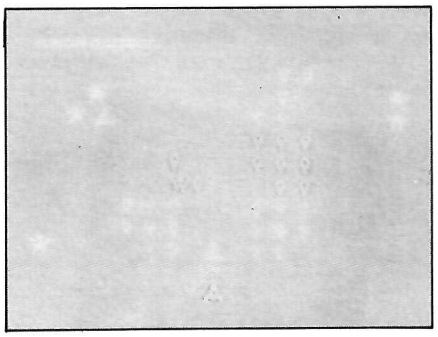
SPACE GAMES FOR THE SINCLAIR SPECTRUM AND ACORN ELECTRON FROM THE COUNTRY'S FOREMOST SOFTWARE HOUSES REVIEWED BY IAN GRAHAM



Doncaster DN11 9LA
Tel: (0302) 744129

This was the unexpected star of this issue's selection for me. The scenario is as follows: blue warlords on horseback fly around the screen. They are equipped with lances. Your white knight, also on a winged horse, must chase and unsaddle them. Unless you follow through and kill the knight, his horse will eventually fly back to collect him. An evil bird of war appears on the scene now and then. Any challenge to the bird results in certain death. Nothing out of the ordinary – an everyday tale of jousting folk.

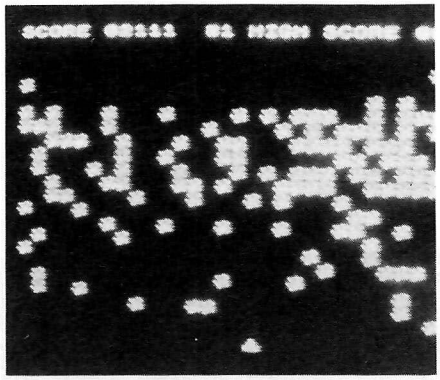
I was pleased first of all to find that the tape carried a good strong data signal – no problems loading the program. The game graphics are very good. The horses' flapping wings are accompanied by an excellent fluttering background sound effect – not too loud. The horses' motion is also very good. They appear to have inertia. In other words, when you press a movement control, it takes a moment or two for the horse to get up full speed in any direction. Similarly, it doesn't stop dead when you take your finger off the key. Also, the horses' leg positions are different for their respective movements – tucked up underneath when airborne, pushed forward as the horse slows down from a forward gallop, etc. Of course the motion is complicated because you not only have to cope with forwards and backwards motion, but also up and down. It isn't sufficient to concentrate on knocking each blue warlord off his mount. If you do, other blue warlords will dismount you. Winged Warlords can be played by one or two players.



Title: Cosmic Guerilla
Micro: Sinclair Spectrum
From: Crystal Computing
2 Ashton Way
East Herrington
Sunderland SR3 3RX
Tel: (061) 205 6603

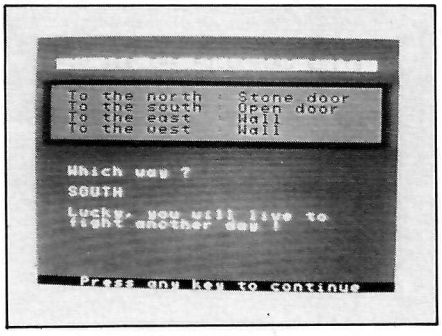
Ion laser cannons are at stake here. Aliens line up on the screen and periodically, they move across to the middle of the screen and steal the cannons. You can use your base at the bottom of the screen to zap the aliens after they start moving. Sounds straightforward. To make it a little more interesting, there are a total of 24 game variations – four options, each with six levels of difficulty. The options range from a training mode to combinations of extra alien motherships and fast mutant aliens, all of which complicate your bid for the highest score.

Cosmic Guerilla can be played by one or two players. It plays rather like Space Invaders – you move a base left and right, firing up the screen at invaders, except that in this case the screen is divided in two with separate action going on in the left and right halves. The difficulty is that you only have one base to cope with both halves.



Title: Bug Blaster
Micro: Sinclair Spectrum
From: Crystal Computing
2 Ashton Way
East Herrington
Sunderland SR3 3RX
Tel: (061) 205 6603

In appearance, this is similar to Salamander's Gridrunner (reviewed in June/July '84). Crystal's game involves extremely mobile amoebae, flies and lizards, which zip across the screen, gradually moving down towards your laser base start position. You can move left, right, up and down. The amoebae 'mutate' into algae as the game progresses. The object is to blast them all without being hit yourself. Bug Blaster incorporates voice activated laser firing. Although Crystal Computing can't guarantee that it will work with every recorder/computer set-up, it might add an interesting extra dimension to your game.

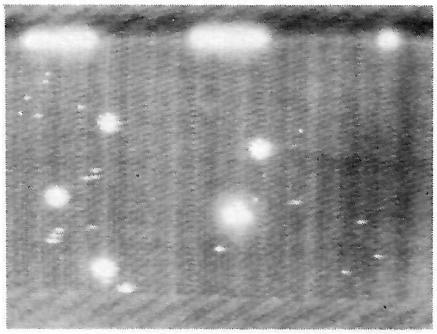

To the north Stone door
To the south Open door
To the east Wall
To the west Wall
Which way ?
SOUTH
Lucky you will live to fight another day !
Press any key to continue

Title: The Dungeon Master
Micro: Sinclair Spectrum
From: Crystal Computing
2 Ashton Way
East Herrington
Sunderland SR3 3RX
Tel: (061) 205 6603

The instructions for this program run to nine sides of a specially extended cassette sleeve. That gives you some idea of how complicated Dungeon Master is. It's one for adventure game fans. You enter the dungeon and try to accomplish the task set for you. Although a dungeon is recorded on the tape for you, you can modify it to suit your own requirements. Indeed, the program allows you to build up whatever dungeon you wish, record it on tape and then load it into the game instead of the dungeon provided. Your character has a number of attributes, some of which increase in value during a game – experience, wisdom, etc. To prevent you from having to start each game afresh with a brand new inexperienced character, the program allows you to record your character on tape and reload him into the next game ready to continue the fray.

It's basically a game of moving around a dungeon, avoiding or fighting nasties, acquiring treasure and armour, trying to do the task you have been given at the beginning of the game. Very absorbing. Not one for the over-eager or impulsive.

One side of the tape contains the Dungeon Master program. The other side contains a program called the Dungeon Creator, which has all the facilities you need to modify your own dungeons for use with Dungeon Master. A very comprehensive package.



Title: Star Warrior
Micro: Sinclair Spectrum
From: Visions (Software Factory) Ltd
1 Felgate Mews
Studlands Street
London W6 9JT
Tel: (01) 748 7478

The signal level (measured by VU meter) on this tape was very low indeed and the program was consequently very difficult to load into *Space Voyager's* Spectrum computer. There didn't seem to be much to *Star Warrior* on a first run through. A spacecraft appeared on the screen. Keyboard or joystick controls allow it to be moved up and down, and left and right. A stream of meteors rush past the spacecraft. You can destroy them with your blasters.

The game's apparent simplicity was entirely due to the editorial ineptitude at accumulating a high enough score to prompt the program to jump to the next phase. In fact, there's a second *and* a third phase. Well, variety's the spice of life and a three phase structure certainly livens up this game. You have to switch from one style of play to another very quickly to stay alive. A competent game, but continual loading difficulties took the edge off its eventual enjoyment.

# S-F ON VIDEO

IN THIS NEW REGULAR COLUMN, MARK GORTON CASTS A CRITICAL SCIENCE FICTION EYE OVER IS VIDEO CHOICE.

Scanners at the ready – it's time once again to look at some science fiction videos you can rent or maybe add to your SF video library. But first let me remind you about the *SPACE VOYAGER* video rating system:

* Poor
** Not So Bad
*** Good
**** Outstanding
● The Black Hole (for any video which belongs in one)

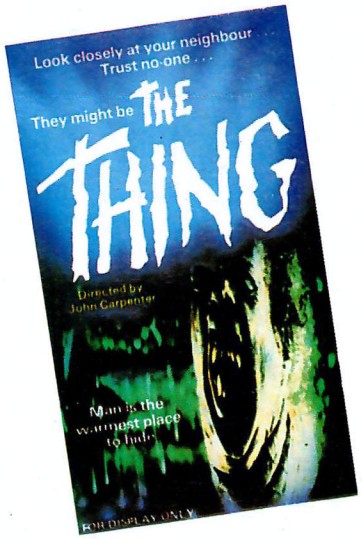
### Dollops and sprinkles

**2019: AFTER THE FALL OF NEW YORK** (VTC) is a post-atomic pot-boiler. Take a few science fiction clichés, stir as vigorously as the budget and ability of the scriptwriter allow and the result is a poor taste movie about the search for the only fertile woman left in the world. Once found, she's to be whisked off to Alpha Centauri to help establish a new human race on a new world. If you fancy a good dollop of *Mad Max* seasoned with a sprinkle of martial arts, a few mutants and the odd cyborg, then 2019 could make a reasonable take-away from your local video library. But it's certainly not worth buying. What there is of plot is ill thought out, there's too much gratuitous violence and the action sequences used to flesh out the very bare bones of the story soon become tedious, despite being neatly directed and edited. What's more, the visual effects are far from special and the acting (dubbed into English from Italian) not so much wooden as dry-rotten. In short, though 2019 has the odd merit, I'm afraid I can barely recommend it. So I suppose you can guess its rating:

**2019: ***

### Whys and wherefores

**XTRO** (PolyGram) begins with a UFO abduction. As Sam and his son Tony play happily outside their cottage, day turns suddenly to night. Then the unnatural darkness is torn by a blinding light and as the stagehands put the wind machine in top gear Sam is drawn into a dazzling, triangular craft. Three years later another visitation takes place: a hideous alien makes earthfall, carves up a couple of victims, and finally rapes an unfortunate girl. The result of this repugnant union is an even more repugnant birth as long lost Sam is brought back into the world. It transpires that he's come for young Tony, who's soon given telekinetic powers by his evil dad. Trouble is, all the way through **XTRO** I found myself asking 'why?' . . . Why was Sam taken? Why has he come back? Why does he want Tony? **XTRO**, besides being rather unpleasant in places, is undermined by its use of science fiction not to tell a story, but to pull off a succession of trite set pieces. True, there are moments of suspense and horror, and a clever scene when




***Fangs ain't wot they used to be. Would you buy a used car from this man? (XTRO).*** **Photo: Polygram Video.**

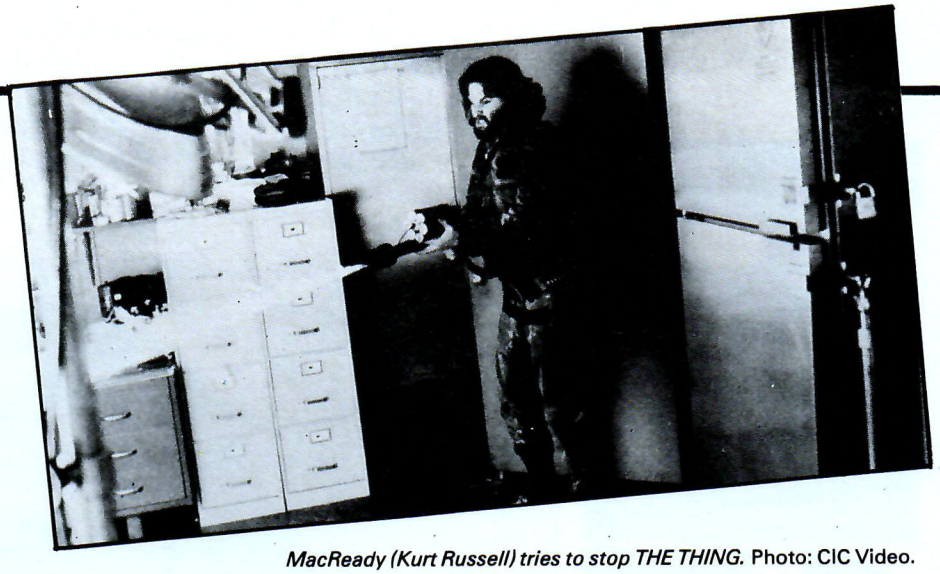
telekinetic Tony sends a six foot action man (played by robot dancer Tik – *or is it Tok?*) to eliminate the old dear who lives in the flat below. But overall **XTRO** tends to look like scenes from any number of different movies strung together. Still, you may want to take a look, even though I can award no higher rating than:

**XTRO: ****

### Thingummy's remake

Next, ***THE THING*** (CIC). I'm a great fan of director John Carpenter, the master of manipulation who brought you screamies like *Halloween* and *The Fog*. Carpenter can put you on the edge of your seat (or behind the sofa) with consummate ease. Often his films place ordinary characters in extraordinary and threatening situations. You may know what to expect, but certainly not when. Maybe there's something behind that door. The ominous music leads you to think so. For a moment you're the camera, looking hard at that door. Finally it's opened and . . . nothing. Later, in the most relaxed circumstances, another door is opened, and just when you suspected nothing . . . there's the maniac, the corpse, or even . . . **THE THING!** So it was with a sense of anticipation that I loaded Carpenter's **THE THING** (which, of course, is a remake of the 'fifties thriller directed by Howard Hawkes) into my tape machine. By the final credits I have to say I was disappointed . . . but not much. Hawkes' film (which is often unjustly remembered for the line delivered by a scientist examining a piece of the monster's tissue: *'My God! You know what we're dealing with here? An intellectual carrot! The mind boggles!'*) is a suspenseful piece in which the alien is rarely seen. Carpenter, on the other hand, relies too much on the brilliant special effects people who, without doubt, spawned probably the most hideous creatures ever seen on the screen. Technically then, his **THE THING** is superb, but as a piece of SF film-making give me the original any time. Of course Carpenter spins terrific suspense around the idea of an alien which duplicates the beings it destroys, and **THE THING** is definitely worth a view. As the movie closes only two survivors remain. Is it my imagination, or does only one of them have breath warm enough to condense in the cold air? Look for yourself. As for the rating:

**THE THING: *****



***MacReady (Kurt Russell) tries to stop THE THING.*** Photo: CIC Video.

### Threadbare hubcaps!

Finally a word about **PLAN 9 FROM OUTER SPACE** (Palace). **PLAN 9** has a reputation as the worst film ever made, on a budget which was not so much shoestring as totally threadbare. The flying saucers are actually flying hubcaps, star Bela Lugosi died two days into shooting and was replaced by a considerably taller stand-in, gravestones fall over in a scene for which more than one take could obviously not be afforded . . . and the result is a mess, but an endearing mess at that. Rating:

**PLAN 9 FROM OUTER SPACE: ●**

or

**PLAN 9 FROM OUTER SPACE: ******

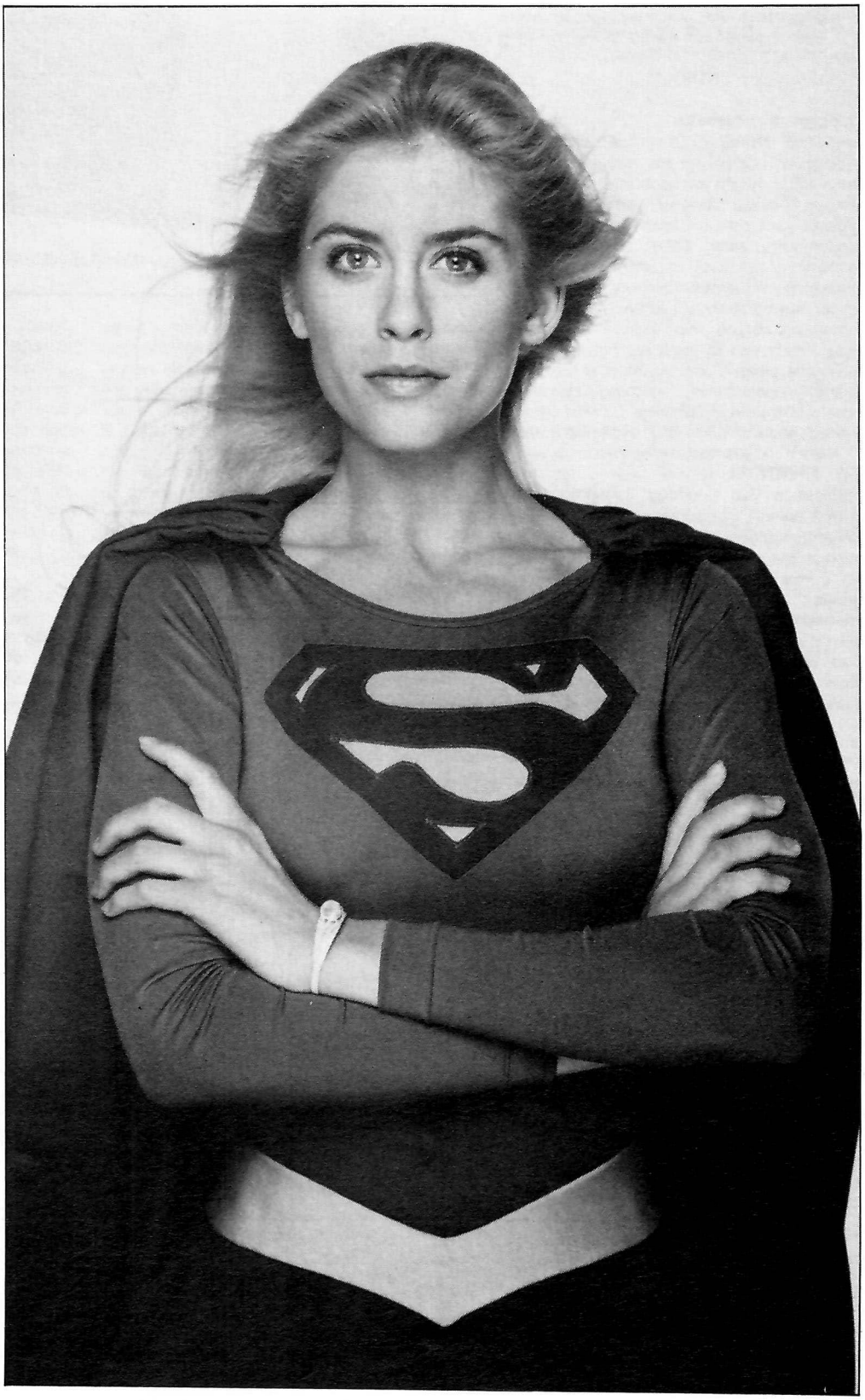
depending on your sense of humour

So that's all for this issue. I'll be back in a couple of months with some more video views. Be seeing you.

***Behind the scenes at Gardener's World. Geoff Hamilton tends to the herb garden (XTRO).*** Photo: Polygram Video.

# SUPERGIRL

HELEN SLATER, AN UNKNOWN ACTRESS AND GRADUATE OF THE MANHATTAN SCHOOL OF THE PERFORMING ARTS, IMMORTALISED BY THE *FAME* FILM AND TELEVISION SERIES, HAS LANDED THE PLUM ROLE OF SUPERGIRL IN THE FORTHCOMING MOVIE. AMID HER BUSY ATLANTIC-HOPPING SCHEDULE, JOHNNY BLACK INTERVIEWED HER FOR *SPACE VOYAGER*.



Helen Slater is the living proof that, however soft and soapy it may be, there's more than a grain of truth in the *Fame* television show.

Just turned 20, Helen is a graduate of Manhattan's High School Of The Performing Arts, the real life college on which the *Fame* movie and television series are based and, suddenly, she's famous, plucked from obscurity to star in *Supergirl*, the fourth mega-epic in Alexander and Ilya Salkind's patchy *Superman* series of box office bludgeons.

Whether the *Supergirl* movie is any better than its predecessors, you can judge for yourself, but if it isn't, it won't be Helen Slater's fault. The girl is independent, intelligent, philosophical and refreshingly honest.

I met her just before she returned to America after almost a year filming in Britain. We talked in her rooms at The Atheneum, a London Hotel overlooking Piccadilly.

**Space Voyager:** When did you first hear about *Supergirl*?

**Helen Slater:** *It kind of passed me by when I was a kid. See, the comic died in 1962, so I never knew much about her until the audition came up.*

**SV:** If you never saw *Supergirl* as a child, was there another comic character you identified with?

**HS:** *Not in a comic book but . . . DUMBO! You know? Dumbo the Elephant in the Disney cartoons. You'd never find a sweeter character than that.*

**SV:** What do you think of the way women are portrayed in comic books?

**HS:** *It's quite ugly in my opinion. It's a man's image. Maybe ugly is the wrong word because they all have beautiful bodies but . . . living in a western society most super-heroines have this overtly sexual thing.*

*In fact, they were very tentative about casting me because I'm not exactly buxom. I guess the strongest force I came up against in making the film was Jeannot Swarc, the director, and fortunately he wanted a more delicate, feminine characterisation, so we didn't clash too much.*

**SV:** Where did you grow up?

**HS:** *I was born in Massapequoia, a small, little town on Long Island, but the family has moved around a bit. My main education comes from Performing Arts in Manhattan over the last five years.*

**SV:** That's the school *Fame* was based on?

**HS:** *Right. The TV show catches the spirit, but it gives you no idea of how much work actually goes on in the classes. That's where I learned the craft of acting but, more important in some ways, it was where I mixed with people from all walks of life – black people from Harlem and the ghettoes, poor people and very rich people all wanting the same thing.*

**SV:** So how did you land the *Supergirl* role?

**HS:** *I heard about it on the Performing Arts grapevine and sent a video of myself to the producer. He must have liked it, because then I came to London for tests. It was supposed to be a five day visit but I was kept for two weeks, spent my nineteenth birthday in a tiny hotel room, desperate to go home. I was actually on my way to the airport when I heard I'd landed it.*

**SV:** How did you feel about it?

**HS:** *What still amazes me is that, for my first film part, I'm playing such an innocent and pure and noble person. I mean, not that I've been a really bad girl but . . .*

**SV:** But what?

**HS:** *Well, when I was 15, I went on an outward bound expedition. A dozen of us, climbing the volcano, Mount St Helens, before it blew up. But the people were so badly prepared and I was getting bad vibes from them, so me and this girl Dominique just took off on our own, went backpacking up the West Coast of California. We had the police out looking for us in three states.*

**SV:** Did they find you?

**HS:** *No, we were gone for about two weeks, just living off the land, learning to be with nature, learning to meditate. We finally came back down, and we were forced to re-join the expedition. But now we were hanging out with the leaders, and we had affairs with them. We just went wild. I'll tell ya, I still think about it.*

**SV:** Did Christopher Reeve give you any advice about the role?

***Up, up and away. Supergirl blasts off for a round of wrong-righting and do-gooding, super-hero style.***

---

**HS:** *Well, I'm not a good advice taker. Everybody wants to put in their two cents worth when they can, but . . . Chris isn't in the film, you know? Just a poster of him.*

*I met him though, and he's such a gracious man. The nicest thing was he didn't offer any advice at all.*

**SV:** Was it a bit worrying, for your first role, to star in a film whose cast includes Peter O'Toole, Faye Dunaway and Mia Farrow?

**HS:** *The funny thing is, acting is acting. I had it in my mind that it would be real scary but, in the end, it was just acting, and I had the benefit of how wonderful Peter O'Toole was.*

**SV:** He plays your father in the film . . .

**HS:** *Yes, but he really took me under his wing. I've never forgotten how beautiful he looked in Lawrence Of Arabia, but now he's become one of my greatest teachers. He had me playing Juliet for him, and he would read me Shakespeare sonnets and make me tell him what I thought.*

*I suppose he's really very eccentric. We had philosophical and religious discussions that went on for days. He's like a prince.*

**SV:** Are you a religious person then?

**HS:** *I would say so. I don't actually have a religion, but I'm attracted to Taoism because it embraces the dark as well as the light side.*

**SV:** Have you thought about the religious overtones in the *Superman* legend?

HS: *Let me tell you, when I got the audition, I got my leotard and whatever, and I put Handel's Messiah on my stereo and blasted it at myself in my room. It's brilliant music to get yourself into that archetypal state of being.*

*For me,* Supergirl *embraces a lot of those purest and highest states but you have to remember it's all relative. She wasn't incredibly bright by the standards of her home planet, but compared to us she's a genius.*

**SV:** Did you think of it as a potentially feminist role?

**HS:** *Feminist? It's a shame, because feminism was something that could have been beautiful, but now it's just a game people play. It's an irrelevant tag. I can't relate to myself as a feminist. I think of how I relate to other human beings, or to God, or myself, or my work.*

**SV:** How did you want to play the role?

**HS:** *The seed of it to me is that she's like a student, an apprentice. She comes here quite unaware of the powers she'll have.*

*I certainly didn't want her to come across as overly sexy. If she does, that's just one branch out of the whole tree.*

**SV:** Did that conflict with how the Salkinds saw it?

**HS:** *Not too much, although I had to be built up quite a bit for it. Another thing was that I'd have liked her to have more of that awe-struck feeling you get from the best clowns.*

*One scene that I didn't like is where she kisses this guy. I mean, the relationship is very delicate until then, and my personal feeling is that the kiss makes her too human. It destroys the myth a bit.*

*I think, perhaps because she's not so well known as* Superman, *they're taking more liberties with the original story.*

*I really shouldn't talk this way, because even I still haven't seen the whole film yet. I just saw that scene and maybe it looks better in context.*

**SV:** Have you managed to get any time to yourself in the last year?

**HS:** *While I've been in England, when I get time off, I've been wandering around street markets and in and out of all the bookstores.*

*I don't spend a lot of time with actors though. Most of my friends in America and here, are musicians. I've been spending a lot of time with Paul Young and his group, because I love that kind of soulful singing.*

**SV:** Has there been any attempt to mould you like an old-fashioned Hollywood starlet?

**HS:** *They keep trying to get me to dress more nicely for publicity shots and stuff, but really I'm happiest like this, in a sweater and jeans. I have to go to an important cocktail party later, with Ilya and Alex and Jeannot, but I won't dress up for it.*

*I'm young, free and single, and there's a game to be played. Once you decide to play, it can be great fun.*

**SV:** But you're playing with powerful, experienced people.

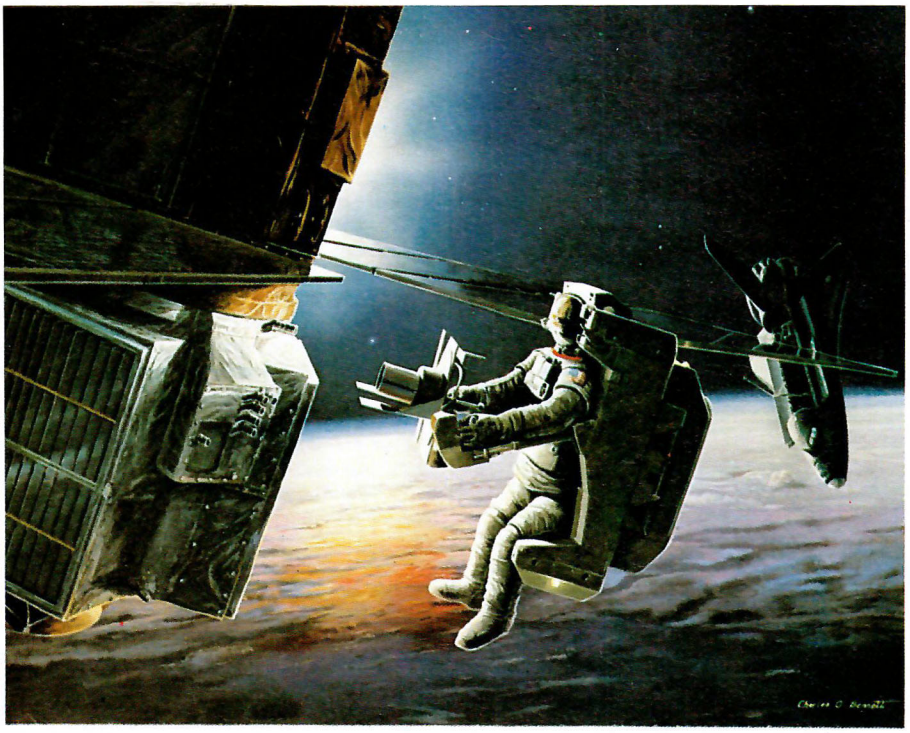
**HS:** *Ilya and Alex? Well, they're human beings first and foremost. This film could be a total disaster so, in that sense, they're as much in the hands of the gods as I am.*

*In a sense, I have less invested in* Supergirl *than any of them. If this film bombs it could put them out of business and, for them, being successful in business is what this lifetime is about. For their sakes I hope it doesn't bomb.*

*Me, I tend to think of success more on a personal, day to day level. There's gotta be more to life than making a film and being famous. Hell, I don't even think that's what acting's about.*

# ALONE IN SPACE

ASTRONAUTS NOW ROUTINELY FLY OFF INTO SPACE WITHOUT A SPACECRAFT! IAN GRAHAM LOOKS AT THE DEVICE THAT MAKES IT ALL POSSIBLE – NASA'S MANNED MANOEUVRING UNIT



***An astronaut using the Manned Manoeuvring Unit (MMU) built at Martin Marietta Denver Aerospace prepares to dock with the Solar Maximum Mission Observatory satellite in an artist's impression. The MMU was tested during the tenth flight of the Space Shuttle in preparation for rescuing the disabled satellite. In fact, the satellite could not be captured by an astronaut flying free in an MMU. It was eventually captured by the Orbiter's remote arm.*** **Photo: Martin Marietta.**

On the tenth flight of the Space Shuttle (41-B), astronaut Bruce McCandless set off into space without a spacecraft, prompting newspaper reports likening him to the comic strip character, Buck Rogers. McCandless's Manned Manoeuvring Unit (MMU) is a good deal bulkier than Rogers' rocket back-pack, but then Rogers had the unfair advantage of being a fictional character!

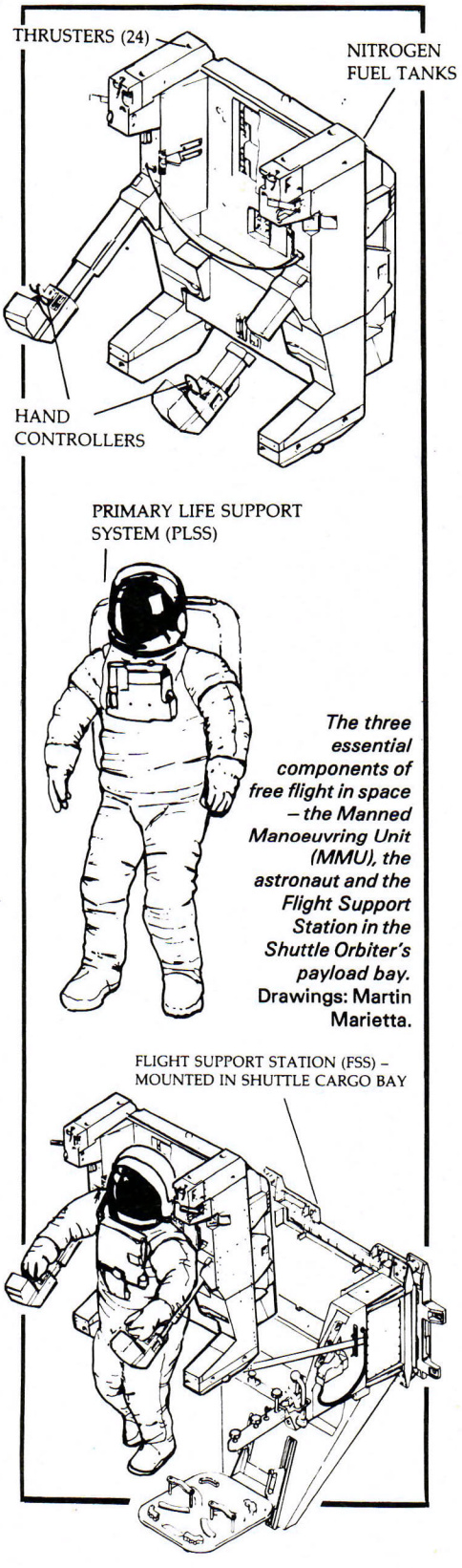
The MMU was developed by Martin Marietta to allow astronauts to move around freely in space near the Shuttle Orbiter without the need for an umbilical connection between the two. The astronaut leaves the Orbiter's crew compartment through an airlock into the cargo bay. He then backs into the MMU and releases himself from the Flight Support Station (FSS). The astronaut can then guide himself around by using a set of nitrogen gas jets, or alternatively he can select an auto-pilot system, which will hold his attitude, freeing one hand.

The MMU, which has been used on both the tenth and eleventh Shuttle flights, is based on a design which has been in development since the early 1970s. An early model, known as the M509, was test flown by five astronauts in Skylab, America's orbiting space station, in 1973 and 1974. The results of those tests have been incorporated in the development of the MMU now in service.

Each MMU is 1.25 metres high, by 83 centimetres wide and 1.21 metres deep (with the hand controllers fully extended) and weighs 153 kilograms. The attitude control system will accept up to almost 12 kilograms of nitrogen propellant. Each of the two propellant tanks is pressurised to 3000 pounds per square inch. Power for the control electronics is supplied by a 16.8 volt silver-zinc battery.

Attitude control is achieved by 24 jets, capable of producing 7.6 newtons (1.7 pounds) of thrust. This amount of propellant should allow astronauts to fly EVAs (Extra Vehicular Activities – 'spacewalks') lasting up to six hours. After that, the unit's nitrogen tanks can be recharged from the Orbiter.

Martin Marietta are now using a special space operations simulator to develop techniques for flying the MMU. In the simulator, astronauts can manoeuvre around full-size mock-ups of orbiting satellites or the underside of the Shuttle Orbiter.


THRUSTERS (24)
NITROGEN FUEL TANKS
HAND CONTROLLERS
PRIMARY LIFE SUPPORT SYSTEM (PLSS)
FLIGHT SUPPORT STATION (FSS) – MOUNTED IN SHUTTLE CARGO BAY

***The three essential components of free flight in space – the Manned Manoeuvring Unit (MMU), the astronaut and the Flight Support Station in the Shuttle Orbiter's payload bay.*** **Drawings: Martin Marietta.**

# JONES MODELS

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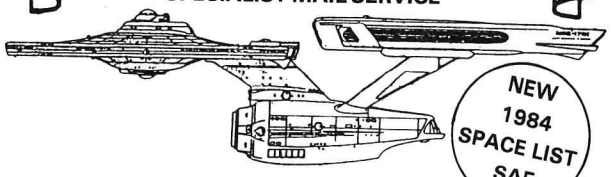

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# MICRO-COMPUTERS & MODELLING

Home computers have found their way into almost every hobby, and modelling is no exception. We're keen to know how you've been using your micro to enhance your modelling, and would like you to write and tell us about it – and we'll make it worth your while!

Just write to us a brief account of how you've used your computer, which micro you use, and how you programmed it. If we use your idea in the magazine, we'll pay you at proper contributor's rates – and you needn't worry about your writing style, our sub-editors will make sure it's published in good English!

**Send your ideas to Ken Jones (SPACE VOYAGER) Argus Specialist Publications Ltd., P.O. Box 35, Wolsey House, Wolsey Road, Hemel Hempstead, Herts.**

**SPACE VOYAGER**

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WE SEEM TO BE A NATION OF GADGET FANATICS, MORE SO THAN EITHER AMERICA OR JAPAN JUST AS WE'VE ALL PROVIDED OUR TELEVISION SETS WITH THE COMPANY OF A VIDEO RECORDER, THE VIDEO RECORDER DROPS OUT OF SIGHT AND THE HOME COMPUTER BOOM TAKES OFF IAN GRAHAM LOOKS AT THE MOST POPULAR PRODUCTS

Computers are popping up everywhere these days – they prepare your electricity bill, store your bank balance and monitor your car's engine performance. They guide spacecraft and measure the radiation arriving from distant stars. They even talk to you on the phone sometimes. Now they're invading the home at an incredible rate. Britain is taking to the home computer faster than any other country. We're a nation of gadget freaks – the same phenomenon attended the introduction of the home video recorder.

If you want to get in on the micro revolution, you need a micro, but which one do you buy? Does a higher price mean better quality? Should you duplicate whatever the children are using at school, or is that purely an educational computer that would be useless in the home? Is big beautiful, or just old-fashioned? Aren't they all the same inside the case, or do different products offer different facilities? Should you go for 'cheap and cheerful' or 'expensive and durable'?

The list of questions seem to trip endlessly from the tongue of the novice buyer. Most consumers will carefully weigh up the pros and cons of various models of 35 mm camera, colour television set or fridge before opting for the one that most closely fits their requirements. The same consumer will wander into a shop with an open mind (and wallet) and come out with whichever computer the salesman recommends. The stumbling block between the consumer and common sense seems to be the erroneous assumption that a computer is a mysterious 'new age' device which doesn't conform to the same market forces as other products.

The reality is that the market-place is potentially an even more hazardous playground for the consumer in pursuit of a computer than of any other consumer product. And that's because the computer is an unfamiliar item. You can tell if a kitchen cooker, or a car is old-fashioned and not worth buying just by looking at it. You can follow price trends in television sets, hi-fi units or typewriters year after year and gain a 'feel' for what is good value. But what social history does the computer have? Virtually none. The technology is new to the High Street and is even now undergoing rapid and radical changes that make today's good buy tomorrow's old banger. How, then, can you gauge what is a good value? Price aside, how can you evaluate which product offers the facilities that best suit your needs?

Just as no single pop record necessarily indicates current tastes in popular music but monitoring the Top Ten charts may reveal current trends, a look at the computer top ten may be helpful in much the same way. As new products come onto the market and sales of older models begin to falter, the top ten computer charts change from week to week. But some manufacturers and their computers crop up again and again, achieving consistently good results, and that must say something about the quality and suitability of their products.

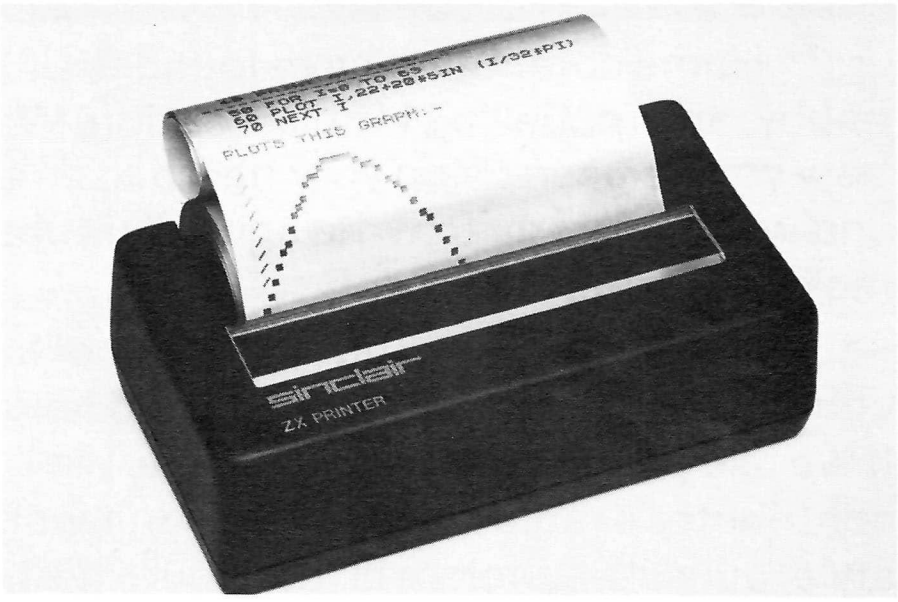
Since it wouldn't be very helpful to look at the top ten sales for any single week, I've selected my own top ten that reflects the popularity of home computers currently in the shops. The entries are not offered in any particular order, because sales fluctuate from week to week and the various models continually jockey for position in the charts. I've also looked at the manufacturers of these models and added notes on their newer models that haven't yet made it into the charts. Taken all together, it should give you a good idea of what is available and what it's suitable for.

Should you duplicate what the children are using at school? That depends what they're using at school. If it's a BBC Micro or Spectrum, then it's probably worthwhile buying the same micro for the home. But if it's an older model or a 'special' educational computer, then it might well be counter-productive to ignore the most sophisticated current models.

## Sinclair ZX81

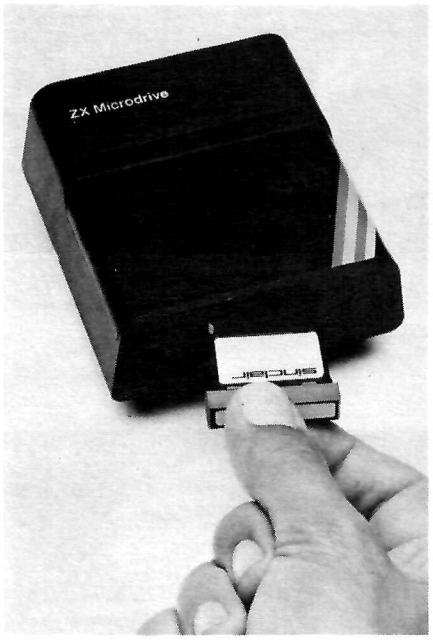
The ZX81's innovative design, low price and Sinclair's clever marketing strategy provided the 'push' that started the home computer stampede in Britain. Although home computer technology has gone on improving apace, the ZX81 is still with us. New software ceased to appear in any quantity some time ago, but so much software was already available that it shouldn't be a problem. Compared with current models of tiny computer, the ZX81 looks very primitive – no colour, no sound, tiny memory and membrane keyboard.

However, the ZX81 is still worth buying in some circumstances. For instance, if you want




*The Sinclair ZX Printer can be used with the ZX81 or Spectrum microcomputers. It offers an inexpensive way of obtaining a permanent record of the computer's output. Photo: Sinclair Research*

# HOME COMPU




*Above: Sinclair's best-selling ZX81. It's tiny memory can be augmented with the 16K RAM PACK shown here. Photo: Sinclair Research*

*Left: The ZX Microdrive tape storage system offers a way of storing data and retrieving it again faster than is possible with an ordinary tape recorder. Photo: Sinclair Research*

any old computer to learn something about computers in general, the absence of colour and sound doesn't matter and its cheapness is an advantage. The ZX81 uses a version of the most common computer programming language (BASIC), so it's perfectly adequate for teaching yourself a little about programming. If you're interested in using computers to control other pieces of machinery, the ZX81 can be used as a control computer.

The tiny memory means that you can only use very small, simple programs, but that's not a bad restraint on the novice programmer. Having much more memory than you need can encourage lazy, wasteful programming habits.

If you find the ZX81's 1K memory too small, an add-on 16K memory module is available.

The keyboard is very unsatisfactory – it's difficult to type on, because of its response. It's a flat piece of plastic overprinted with key-shaped symbols. Unlike almost all other computers, you don't need to be able to type to use the keyboard. Pressing a single key results in an entire word appearing on the screen. The computer 'knows' whether it should display a word or a single character by constantly referring to the grammar or 'syntax' of its own computer language.

The only area where the ZX81 is woefully inadequate now is games playing. The silent, black and white display pales beside the multi-coloured pictures with full sound effects offered by current models. Of course, the ZX81's greatest attraction is its cheapness at around £40. Look out for special offers – perhaps offering the computer plus its extra memory (16K Rampack) at a discount price.

### Sinclair Spectrum

The Spectrum was Sinclair's follow-up to the ZX81. Like the ZX81, it exemplifies Sinclair's policy of technical innovation. Clive Sinclair doesn't follow trends, he creates them. That's probably why he's now Sir Clive Sinclair. The Spectrum offers the facilities that the ZX81 lacked – colour picture, simple sound effects, more memory and more programming commands. A huge range of games programs are available, making the Spectrum the most popular games computer currently available.

There are two versions of the Spectrum – 16K and 48K. The only difference is that the latter's memory is three times the size of the former. Program cassette covers should state whether the program is suitable for both versions (typically – 'for any ZX Spectrum') or only the larger memory model. Like the ZX81, the Spectrum uses a single key entry system (pressing one key produces a whole word on the screen). The keyboard, a calculator type, is a great improvement on that of the ZX81, but still not up to typewriter standards, so the Spectrum isn't suitable for word processing.

### BBC Micro

Acorn Computers had been a relatively small British computer manufacturer until the BBC chose its design for the computer to be featured on the television series 'The Computer Programme'. The BBC Micro has an outstanding specification. Although the television series was aimed at introducing absolute beginners to the world of computers and programming, the computer itself goes way beyond that introductory concept. It is equally at home in the classroom (where many of them are to be found now), the home, the office or the science laboratory.

In schools, the BBC Micro is being used to train the next generation computer owners. In the home, it is an excellent games computer. In the office, its good quality keyboard and

# UTER TOP TEN

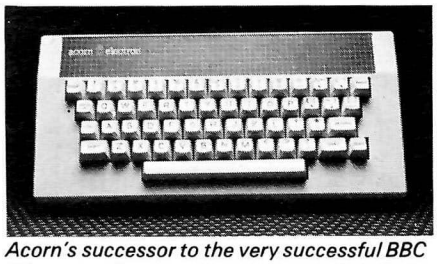
flexible screen display makes it ideal for use as a word processor. In the science laboratory, it is equally useful for storing experimental results, processing satellite images electronically or even controlling other machinery.

The more sophisticated (and pricey) of its two versions, the Model B, is supplied with a generous variety connections that allow almost any other piece of computer hardware (printer, disk drive, tape recorder, joysticks, light pen, etc) to be linked to it. The screen display is particularly impressive. Most computers are limited to a single text format (40 rows of 32 characters, for instance) and one or perhaps two different graphics formats (one allowing more detail to be shown than the other). The BBC Micro Model B has no less than eight different screen formats, offering different combinations of text and graphics formats for different applications. Also, the way in which it stores its own keyboard characters means that text and graphics can be mixed more freely and easily than is the case with most other home computers.

Sound facilities are very good too. Steady, musical tones can be played on three channels simultaneously – chords in other words. There's also a channel devoted entirely to sound effects. Not only that, but sounds can be shaped by using the formidable ENVELOPE command. It allows the pitch and amplitude of a sound to be changed while it is playing.

Its memory size is, by today's standards, modest at 32K, but that's adequate for most applications. If you should find that you need more, memory expansion kits are readily available. The language the BBC Micro uses is a particularly good version of BASIC incorporating commands and structures intended to encourage good programming techniques. The documentation, the 'User Guide', that comes with the computer is excellent. It's written in plain English, comprehensively indexed and clearly laid out – very good indeed! Although it's beginning to look a bit pricey now, whatever your application do look at the BBC Micro before making a final decision.

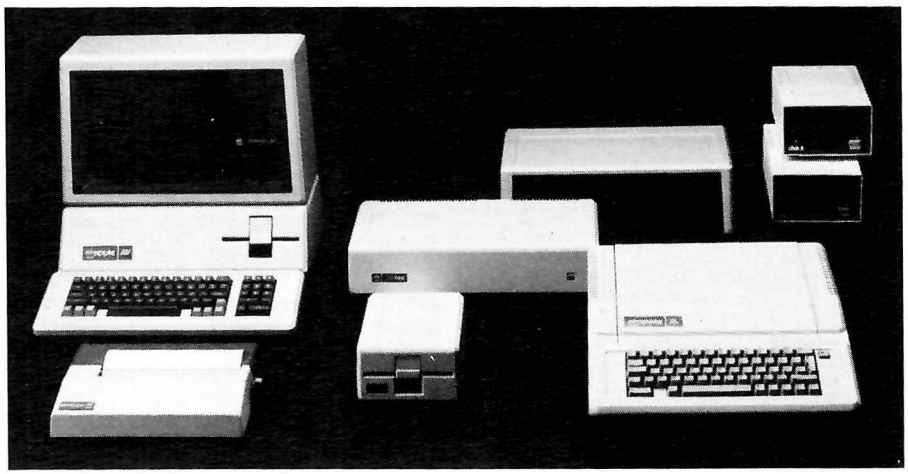
*Acorn's BBC Micro has found a niche for itself in most personal computer applications – from games in the home to scientific or mathematical work in laboratories, and of course educational applications in schools. Photo: Acorn Computers.*



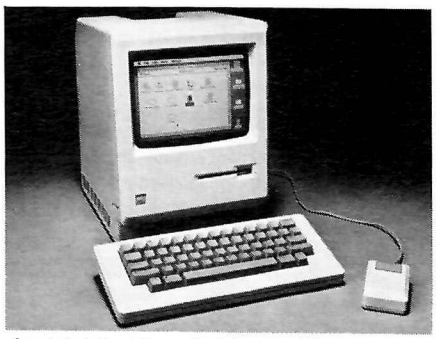
*Acorn's successor to the very successful BBC Micro, the Electron capitalises on the aspects of the computer most suited to the home games and educational markets. Photo: Acorn Computers*

*The apparently endlessly popular VIC-20 from Commodore. Its odd screen display and tiny memory make it an odd choice nowadays. Photo: Commodore Computers*

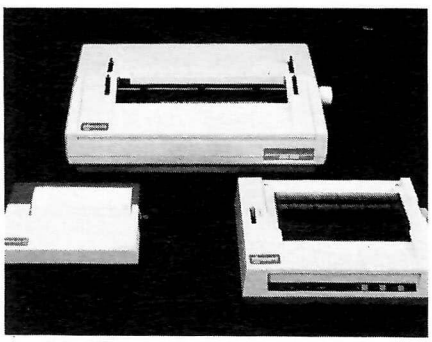
*Commodore's 64K successor to the eccentric VIC-20. Photo: Commodore Computers*



*The ever-popular Apple IIe, seen here with the newer Apple III and their family of add-on equipment. Photo: Apple Computers UK*



*Apple's latest box of tricks, the Macintosh capitalises on the software innovations of the much more expensive Apple Lisa, but the Macintosh is priced for the mass market. Photo: Apple Computers*



*Apple's printer range includes the small and inexpensive thermal Silentype (left), a dot matrix printer (right) and a new letter quality printer (top). Photo: Apple Computers*

### Acorn Electron

The BBC Micro seemed a little expensive and over-sophisticated for many people who basically wanted a good quality games computer. They just didn't want and couldn't use many of the BBC Micro's facilities. In response to that area of the market, Acorn stripped the BBC Micro down and re-jigged the electronics to miniaturise and simplify it further. The result is the Acorn Electron. Although the Electron is aimed at the home games market, it features a high quality keyboard. Even so, on its own it's not suitable for word processing, because it can't be connected directly to a printer. It seems likely, though, that Acorn and independent manufacturers will supply expansion kits in due course. Eventually, the Electron plus all its add-ons should be able to do almost everything the BBC Micro Model B can, but at a higher price of course.

### Commodore Vic-20

The Vic-20 has become an extremely popular computer. On the face of it, though, it has little to offer. Its memory is tiny – 3.5K (less than a

quarter that of the Spectrum). Its text format is distinctly non-standard – 23 lines of 22 giant characters. The version of the BASIC language used is looking a bit old-fashioned now, making things difficult for sound and graphics programmers. Extra memory can be added, but once you start adding bits and pieces on to improve the Vic's performance, the Commodore 64 begins to look like a much betteer buy.

However, as it is such a popular machine, there's lots of software. It also features a good quality keyboard, unusual for such a cheap computer. The Vic has gained such popularity because it was certainly a better buy when it was introduced, it was and is readily available and it is relatively inexpensive. Hence, although it's a non-starter these days on paper, it still features in the home computer top ten sales chart.

*Now superceded by the 'XL' series, the Atari 400 and 800 (shown here) are still around in large numbers. The new XL series has been made software compatible with the older models. Photo: Atari International*

### Commodore 64

Although the 64 looks much the same as the Vic-20, don't be fooled by the superficial similarity. The 64 has a monster memory – 64K as its name suggests. In general, the size of memory quoted in adverts isn't the size of memory available to you for your programs. The computer itself takes over some of that memory for its own purposes, so that, for example, of the Commodore 64's 64K, 38K is available to the user. The computer uses the rest. That's still a pretty big memory.

Commodore's documentation, the manual(s) that you have to read and understand to get the most from the computer, is notoriously poor and Commodore 64 owners report that the 64's manual is no exception. However, as you may have noticed from your local bookshop, whatever computer you have, there is an embarrassingly large range of books and magazines to fill you in on what the manufacturer's documentation leaves out.

Like the Vic-20, the 64 features a high quality keyboard and so it is suitable for word processing and other so-called 'serious' uses. It's also an excellent games computer. If you're a games addict, compare the 64 with the Acorn Electron before buying. If you're a business or more serious home user, compare the 64 with the BBC Micro before buying.

### Apple IIe

Apple computers have achieved phenomenal success worldwide. Their first computer, the Apple II became so popular and so much software was written for it that it became one of the most widely used home and office computers in the world. It's still around! Rather than scrapping its dated design in favour of the newer Apple III, Lisa and Macintosh, Apple took a long hard look at the 'II', made a few changes to bring it up to date and re-released it as the Apple IIe.

The 'IIe' features a larger memory (64K) and more useful text format (24 lines of 80 characters) than its predecessor. All the complimentary remarks you've ever heard about the 'II' apply equally well to the 'IIe'. It's a proven design liked by a lot of people and with lots of software (mainly business) available. The price (over £800) is high for the UK market. Compare with the BBC Micro before buying.

### Atari 600XL

This is the first of Atari's new 'XL' series to be launched in the UK. Construction is sturdier than its 400/800 predecessors. It looks better, too! The 600 runs all your favourites from the 400/800 software list. A high quality keyboard offers the opportunity of using the 600 for word processing. Its main strength of course is in games playing, for which Atari are world famous in the home and amusement arcade.

Memory is a little small – 16K, a quarter of that of the Commodore 64 and half that of the BBC Micro. Atari's decision to make the 600 series compatible with the 400 and 800 means that the version of BASIC used is beginning to fall behind that used by other computers like the BBC Micro and Acorn Electron. But it is substantially cheaper than both of those models. You pays yer money and takes yer choice.

### Oric-1

The Oric-1 is similar in appearance to the Sinclair Spectrum and the Spectrum is indeed its main competitor. Oric owners generally prefer the Oric's keyboard and conventional method of typing instructions in full. The Oric-1 has revealed some faults in its internal program that looks after, amongst other things, transferring programs from the computer to a tape recorder and vice versa. New models will incorporate a new 'ROM' whose faults have been corrected and several new commands have been added to improve matters even further – something to bear in mind if you're thinking of buying a second hand Oric-1.

Although the Oric-1 was said to be designed for expansion, its manufacturer only released one peripheral, a colour printer. Now they have introduced a new model, the Oric Atmos, which features an improved keyboard and the ability to use a wide range of the very common and readily available Centronics-type printers. The Atmos has two peripherals (a colour printer and a micro disk drive). A disk drive allows programs to be stored and retrieved much faster than is possible with an ordinary tape recorder. Both the Oric and Atmos can also use tape recorders for program storage, so you don't have to save up for the disk drive.

### Dragon 32

After a slow start, the Dragon has proved to be a very popular computer. When it entered the market, it was in a very favourable position – more memory than the VIC-20, colour graphics compared to the ZX81's black and white picture, and good availability while the Spectrum and BBC Micro were experiencing long delays in delivery. Its graphics are comparable to those of the Oric or Spectrum, but it has the advantage of a good quality keyboard.

Its sound facilities, whilst limited to a single sound channel, are rather better than the Spectrum's inadequate BEEP command. A sound board giving an extra two sound channels can be added. Sound quality isn't as good as it might be because of the way the Dragon plays its sounds. Unlike other computers with sound facilities, the Dragon uses your television's loudspeaker, not a small built-in loudspeaker.

As the Dragon's sales have picked up momentum, software suppliers have stepped up production of Dragon software, so there is a reasonable supply of programs, mostly games of course.

# READ OUT

## SCIENCE FACT

**'Graphic Art for the BBC Computer' by Boris Allan. Published by Sunshine Books at £5.95. Soft covers.**

This book concerns itself mainly with turtle graphics. However, you don't need to rush out and buy John Billingsley's book, 'DIY Robotics and Sensors for the BBC Computer', and build the turtle described in it. The turtle in this case is an imaginary creature that lives on the surface of your computer's television screen. It behaves in exactly the same way as the turtle robot in Billingsley's book – that is, it can only move forward a specified distance or turn through a specified angle.

The graphics capable of being drawn in this way might seem to be a little limited, but it is in fact capable of producing very intricate designs, while introducing the novice programmer relatively painlessly to sophisticated programming and mathematical techniques. Recursion, for example, is one of those concepts that is much easier to convey in pictures than words.

You won't spend all your time producing pretty patterns, though. By chapter five, you will be tackling charts and graphs instead of snowflakes and waves. The book is illustrated with what appear to be actual print-outs of the programs given – its nice to see what you actually get when you run the programs. Graphic Art for the BBC Computer doesn't show you how to produce dazzling, all-singing and dancing computer game displays, but it does offer an insight into a very important aspect of computer graphics, which you can then incorporate in your own BBC Micro graphics and games programs. IG

**'DIY Robotics and Sensors with the BBC Computer' by John Billingsley. Published by Sunshine Books at £6.95. Soft covers.**

If you're one of the thousands of sensible individuals who have given a home to a BBC Micro, you will undoubtedly have discovered what a versatile piece of equipment it is. You can only play computer games for so long. Eventually you will want to flex your programming muscles and experiment for yourself. There are lots of programming guides on the market. In fact, there are so many that it's difficult to decide which one to buy. Although general programming is well catered for, books on what are currently fringe activities in home computing like computer communications, networking and remote control systems are few and far between.

For that reason I was pleased to see Sunshine books publish this slim volume (approximately 120 pages) on robotics and sensors. You don't have to be interested in building a walking, talking housekeeper to make use of this book. The sub-title is 'practical projects for control applications' and that probably reflects its contents more accurately.

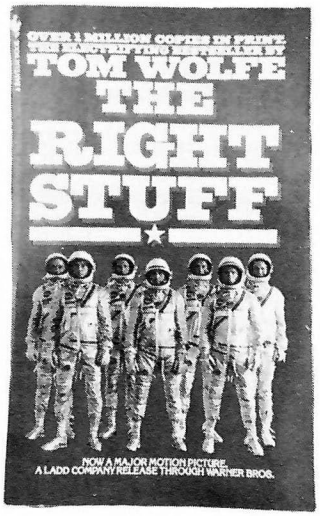
It starts off by explaining how to connect various accessories to the BBC Micro through its analogue port – a joystick and a light pen. You don't even have to seek out a supplier for the accessories. The book includes simple designs for your own do-it-yourself light pen and joystick. It then goes on to develop programs to enable you to use these with the computer and see some practical results on the screen.

Later you'll learn how to connect motors and relays to the computer to control other external equipment. This can be a hazardous exercise, mainly for your computer, so follow the instructions to the letter!

Chapter seven explains how you can build your own turtle – a small robot running on two wheels placed on opposite sides of the structure. If the wheels run in the same direction, the turtle moves straight ahead or backwards. If one stops, or they turn in opposite directions, the turtle turns one way or the other. Getting one of these devices to operate under computer control is the first stage in producing your own robot. Later chapters deal with more sophisticated robot hardware and programming, including simple robot vision.

It's a useful book for anyone who wants to understand more about how to link a computer, the BBC Micro in particular, to the outside world. At £6.95, however, I'd prefer that the many drawings in the book were more polished, professional illustrations instead of the larger than life and apparently roughly hand-drawn diagrams actually used. Although clear enough to follow without confusion, their amateurish appearance does mar the otherwise glossy and authoritative feel to this interesting book. IG

## GENERAL




**'The Right Stuff' by Tom Wolfe. Published by Bamtam/Corgi at £2.50. Soft covers.**

This has been in print some time, but has now been re-issued with a film cover. Strongly based on fact, it covers the first Americans in space. Whether you saw the film or not, and if you have any interest in what is now for many readers history rather than memory, do read this. MV

**'Creations' edited by Isaac Asimov, George Zebrowski and Martin H Greenberg. Published by Harrap at £9.95. Hard covers.**

This is subtitled 'The Quest for Origins in Story and Science', and gives us both articles and stories together. Both are interesting, and I was overjoyed to see Richard McKenna's *Mine Own Ways* reprinted, for a start. It's an awful lot of money, but you could try asking for it at your local library. MV

## SCIENCE FICTION

**'Geta' by Donald Kingsbury. Published by Granada at £2.50. Soft covers.**

This was originally published in the States as 'Courtship Rite', which to my mind is a far more descriptive title, but that's the only complaint that I have. *Geta* tells of a planet of human descendants way out in the sticks whose people are trying to up their general level of intelligence, and of the various cultures that clash, and the Kaiel in particular. Group marriages are common. The three brothers Gaet, Hoemei and Jossai have successfully married two wives and are courting a third. But the Prime Predictor Aesoe commands them instead to marry the heretic Oelita. There is war and love, poison and friendship, in fact 500 pages of action. A marvellous story of some incredible people. I couldn't put it down. MV

**'The Tithonian Factor' by Richard Cowper. Published by Gollancz at £7.95. Hard covers.**

A rather disappointing collection of short stories. Sorry, let's start again, a rather disappointing collection for the author of such good books as *The Road to Corlay* and *Kuldesak*. MV

**'Dark is the Sun' by Philip Jose Farmer. Published by Granada at £1.95. Soft covers.**
This novel is much let down by its cover blurb – when I read that it was about a plant man called Sloosh and a member of the Turtle Tribe who must recover his soul egg I thought *Oh dear me* . . . but really it's not half bad as an adventure tale.

The only difficulty I found on reading it was that while the author might have known what he was describing when introducing some of his weird and wonderful beings, I couldn't form a clear mental picture, which didn't help me follow the action at times.

A special recommendation for this book must go to all Traveller Games Masters who would find a year's supply of scenarios at least within its 400 pages. WG

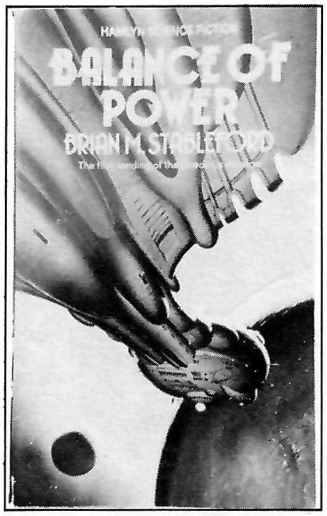
**'Fire in the Abyss', by Stuart Gordon. Published by Arrow Books at £1.95. Soft covers.**
Those of us with grey hairs will remember a television series from long ago called, if memory serves, *Adam Adamant,* in which a man was plucked from his own time to the present.

This story is in the same mould, with one of Sir Walter Raleigh's half brothers yanked to the present by an American experiment gone wrong. But just as Adamant annoyed me by the hero's inability to adjust at all to the present so this book annoyed me by Humphrey Gilbert's total ability to fit in. I thought the style of the book very hard going too, so that my feeling on it all was, *oh, who cares anyway,* about the hero. WG

**'Eclipsing Binaries' – latest of the Family d'Alembert Series by E E 'Doc' Smith with Stephen Goldin. Published by Granada at £1.50. Soft covers.**
This was my introduction to the series, and is the eighth published. Usually readers coming so late into an established series of books are left floundering to some extent by the unread preceeding action and so I expected to be this time, but no.

It is to the authors' credit that *Eclipsing Binaries* not only holds up as a story on its own, but I was made painlessly aware of all the information I needed from previous stories to follow the action.

It is an easy book to read, in the action/adventure mould, with no heavy-handed message thumped home. WG

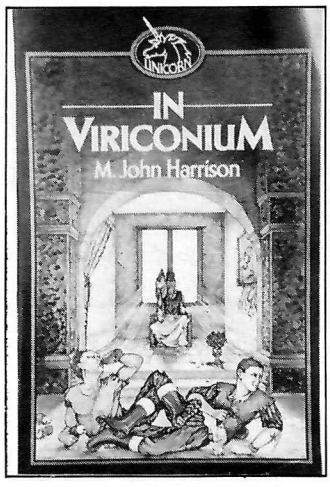



**'Balance of Power' by Brian M Stableford. Published by Hamlyn at £1.75. Soft covers.**
Don't be confused by the cover of this book showing the spaceship Daedalus heading towards its fifth landing, this time on the planet Attica. It's actually a story of colonists from an advanced civilisation (humans) visiting a world of relatively primitive beings. The action begins as the landing party sets out from the human settlement on Lambda towards the far continent (Delta) inhabited by the indigenous species. The parallels with Columbus's expedition to the New World are obvious. However, Columbus didn't have the advantage of Mariel and her ability to read minds.

The crew and officers of the expeditionary ship New Hope do what they do for different reasons and eventually, inevitably, come into conflict. The situation is further complicated by contact with the native species, which is not the homogeneous community that the colonists expect. There are different factions at different levels of social and technological advancement. The humans discover that the master group has acquired its sophistication by an unexpected route.

With the New Hope's crew in disarray, the various native groups distinctly restless and disease rampant in the countryside, the situation looks bleak for reasoned debate. Some of the characters don't make it to the end of the book, but you should. IG

**'Pavane' by Keith Roberts. Published by Gollancz at £8.95. Hard covers.**
Again a reprint, but this is now the full uncut version. Queen Elizabeth the First was assassinated, and the Spanish invaded England successfully. In the England of the twentieth century the Church is still in overall command and many scientific discoveries have been suppressed. Steam trains and semaphore towers are the limits of civilisation, yet in the background there is a hidden force that the authorities and the common people do not suspect. Keith Roberts is a British author who recently has only been in print abroad, yet he was included in Anthony Burgess' list of *99 Best novels of our Time in English.* But ignore all that, read this book because you'll miss a great book if you don't. MV




**'In Viriconium' by M John Harrison. Published by Unwin Paperbacks at £2.25. Soft covers.**
The High City is being attacked by a plague – an invisible, slow-moving plague that no one believes in. This book reminds me of Chamber's classic *The King in Yellow,* in its fantastical imagery and eerie characters. Not for the easily frightened. MV

**'Empire of the East' by Fred Saberhagen. Published by Futura at £2.95. Soft covers.**
This is a rewrite of the trilogy originally published as *The Broken Lands, The Black Mountains* and *Changeling Earth.* Both fantasy and science fiction, this book tells of magic performed on the ruins of a dead scientific empire. Its 558 pages tell of Rolf, the boy who starts off by losing everything, and ends up seeing the defeat of the Armies of the East. The action moves swiftly as magic and technology battle each other, through many places and many lands, until the final moment. The original books were good, but this rewrite has put the story high up in the classic class. MV

**'Greybeard' by Brian Aldiss. Published by Granada at £1.95. Soft covers.**
This is a new issuing of a book first published in 1964 and it left me with mixed feelings. Aldiss has won many of SF-dom's awards for his writing and I enjoyed his style but found as I got into the story I didn't really care about the characters.

It seemed to be another of those post-apocalypse books where noble man and noble woman surmount petty tyrants, fatal illnesses and the excesses of nature (human and otherwise) gone amok to be rounded off

# READ OUT

neatly in the last few pages as they discover one of the few surviving children and fade into the sunset to re-create truth, justice and in this case the British way. **WG**

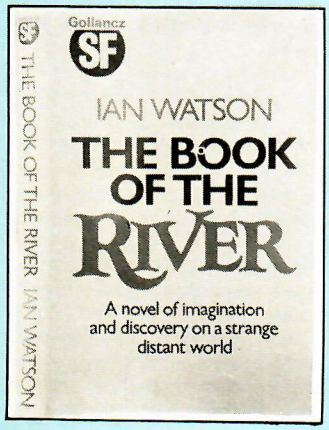
**'Eye of the Queen' by Phillip Mann. Published by Granada at £1.95. Soft covers.**
Creating new worlds is the essence of SF, but how rare it is that a first book by a new author gives us a world which lives and about which we want to know more, so that a reader, on finishing that first book wants to say to the author, 'yes, but what about this character, or that part of the history of the planet?'

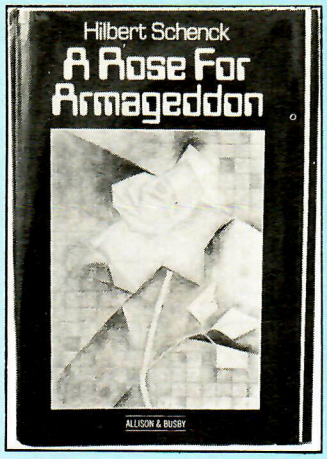
Such a thing happened to Anne McCaffrey, who has found that her dragons just won't go away and I'm hoping that Phillip Mann's Pe-Ellians are clamouring inside him to get onto paper.

The book is the story of the meeting between human and Pe-Ellian. Two humans travel to Pe-Ellia and find a complex world of almost Buddhist mythology where the people go through seven incarnations to attempt perfection, whence they may become Mantissa – Avatar-like beings who order all from the lilies of the field to star systems.

I feel that *Eye of the Queen* is only one small slice of the story of Pe-Ellia, and Mr Mann, over there in New Zealand, I want to read more! **WG**

**'The Book of the River' by Ian Watson. Published by Gollancz at £7.95. Hard covers.**
Ian Watson has produced several books over the years with excellent ideas that have been almost unreadable. But at last Ian seems to have overcome his distaste for words, and written a book that I couldn't put down. Only women can travel on the river, or rather River, for some reason that no one understands. Gradually we find out that these people are not natives, but colonists, and that there is something behind their legends and traditions that is frightening. The book centres on Yaleen, who always wanted to be a riverwoman, her brother, who wants to be a scholar, and the River itself. With luck there might even be a sequel. **MV**


Gollancz
SF
IAN WATSON
THE BOOK OF THE RIVER
A novel of imagination and discovery on a strange distant world
THE BOOK OF THE RIVER IAN WATSON




**'A Rose For Armageddon' by Hilbert Schenck. Published by Allison & Busby at £7.95. Hard covers.**
There have never been so many books dependent on giant computers, nor so many theories about the world and special mysterious parts, such as The Bermuda Triangle. This book brings both ideas together in a brilliant novel of ordinary people watching their world about to disintegrate, and seeing an anomaly that might give a faint chance of survival. One tiny island of Cape Cod is being researched and surveyed when the computer detects a curious blank in the patterns. Surely it can't be significant? But the people involved find that not only their lives, but time itself, is affected. I really enjoyed this book, both for the people and the ideas. **MV**

**'Magician's Gambit' by David Eddings. Published by Century Publishing at £8.95. Hard covers.**
This is the third in the Belgariad series, and certainly the best so far. We travel across Ulgoland to Rak Cthol, meeting Mara, Ul and Aldur on the way, until the final meeting between the wizards Belgarath and Ctuchik. How gorgeous that there are still two more books to come. For once, this is a series that it is worth collecting in hardcover, as it will be reread for years to come. **MV**

**'Doctor Mirabilis' by James Blish. Published by Arrow at £1.95. Soft covers.**
This is a reprint of the life of Roger Bacon, the thirteenth-century thinker and philosopher, who led a life of adventure more suitable to a James Bond rather than a scholar. Both entertaining and thoughtful, it describes the burdens of a man who wanted to discover the truth for himself in an age when only the Church was the arbiter of truth and falsehood. **MV**

**REVIEWERS:**
**MV – Marion van der Voort**
**WG – Wendy Graham**
**IG – Ian Graham**

# CONTRIBUTOR'S GUIDELINES

## or

## How to get into print in five easy lessons

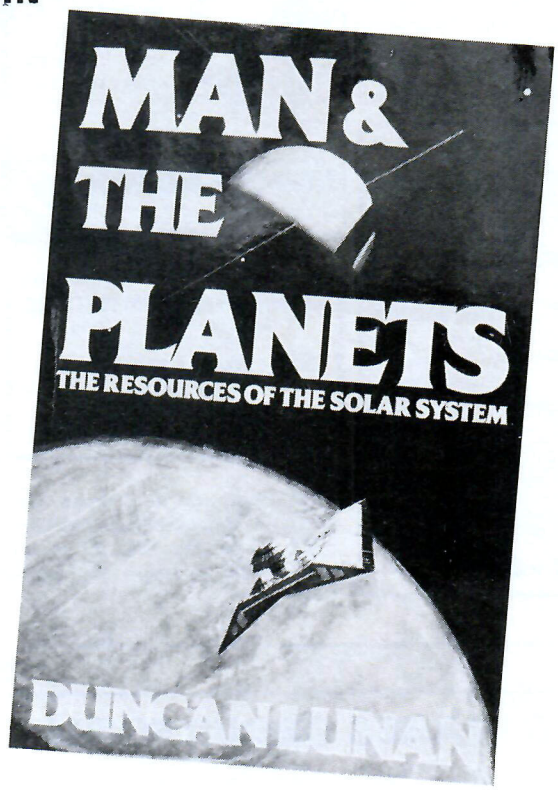
The Space Voyager office in the bowels of A.S.P. regularly receives articles sent in by readers for publication. If you want to send something in for consideration, you can increase your chances of success by following these simple rules:

1. Your article must be typed, double-spaced, on one side only of A4 paper, with wide margins (an inch on either side).
2. You should send all the illustrations necessary (the more the merrier) with the article. Drawings need not be works of art – the Voyager drawing office will probably redraw them anyway. Photographic images can be either prints or transparencies, colour or black and white.
3. You must be the copyright owner of all the material submitted or have obtained whatever clearances are necessary for publication.
4. If a reproduction fee is payable or permission is required for the publication of photos or drawings, this must have been complied with before the article is submitted.
5. Articles that have not been specifically commissioned for publication in Space Voyager by the editor must be accompanied by a stamped, self-addressed envelope.

Whilst A.S.P. and Space Voyager take great care when handling readers' submissions, we cannot be held responsible for any loss or damage to unsolicited material (so keep a copy!).

# MAN & THE PLANETS COMPETITION

## YOUR CHANCE TO WIN A COPY OF DUNCAN LUNAN'S BOOK 'MAN & THE PLANETS' THE RESOURCES OF THE SOLAR SYSTEM




Duncan Lunan's book, *Man & The Planets* analyses the resources of the Solar System and how Man can make use of them. The analysis takes into account space transportation systems and proposals for the colonization of other worlds. It suggests how Man might begin to move out from Mother Earth to spread his influence into the surrounding universe.

You can win a copy of *Man & The Planets,* published by Ashgrove Press, by solving the satellite puzzle given here.

### How to enter

Someone has written down a list of the planets of our Solar System together with most of the known moons that orbit the planets. But they've got the moons all mixed up. All you have to do is unscramble the list and match each planet with the moons that orbit it.

### Now the tricky bit

That's so easy that there's a second part to the competition. Imagine that you have been selected as one of the few representatives of Earth to join the passengers of a spaceship on its way to establish a colony on one of the outer planets. Luggage space is very limited. Apart from a subscription form for Space Voyager, which item from Earth would you insist on taking with you? Then say in 20 words or less the reason for your choice.

So, your entry should consist of a list of planets, each accompanied by the correct set of moons, followed by a valued item to carry with you to your new colony and the reason why you have chosen it. Remember to clip the entry coupon at the corner of the page and enclose it with your entry.

| PLANET | MOONS |
|---|---|
| Mercury | Deimos, Io, Rhea, Pasiphae |
| Venus | Lysithea |
| Earth | Mimas, Himalia, Sinope |
| Mars | Europa, Titan, Carme |
| Jupiter | Ganymede, Enceladus, Titania, Oberon, Nereid, Charon |
| Saturn | Elara, Phoebe |
| Uranus | Miranda, Moon, Callisto, Tethys, Ananke, Hyperion |
| Neptune | Dione, Ariel, Triton, Umbriel, Leda |
| Pluto | Phobos, Amalthea, Iapetus |

### Entries

When you've made some sense of the satellite puzzle and decided what you'd like to take to the outer planets with you from Earth and why, add your name and address. Clip the entry coupon from the corner of the page and send it with your entry to:

**Scrambled Satellites Competition**
**Space Voyager**
**ASP Ltd**
**Wolsey House**
**Wolsey Road**
**Hemel Hempstead**
**Herts HP2 4SS**

### Rules

1. The competition will close on September 14th 1984. The most original entry with a correct listing of the planets and their moons will receive the prize described above.
2. Each entry must be accompanied by the entrant's name, address and the special coupon cut from this page. Each coupon covers only one entry.
3. Proof of posting will not be accepted as proof of receipt. Whilst every care will be taken, the publishers of Space Voyager cannot accept any responsibility for lost entries.
4. The competition is open to all residents of the United Kingdom. The staff of ASP Ltd and their relatives, and Space Voyager's printers, advertisers and contributors are not elligible for entry.
5. The submission of a competition entry implies acceptance of those rules. The editor's decision is final and no correspondence will be entered into.

MAN & THE PLANETS CLIP COUPON

# STAR WARES

## BOOKS & PUBLICATIONS

**FLYING SAUCERS ESOTERIC**
***Viewpoint Aquarius,*** Britain's leading Magazine for the deeper/seven plane study; not solely 'nuts and bolts'. 30 pages monthly, 60p or 4 different copies for £2. Regular meetings.
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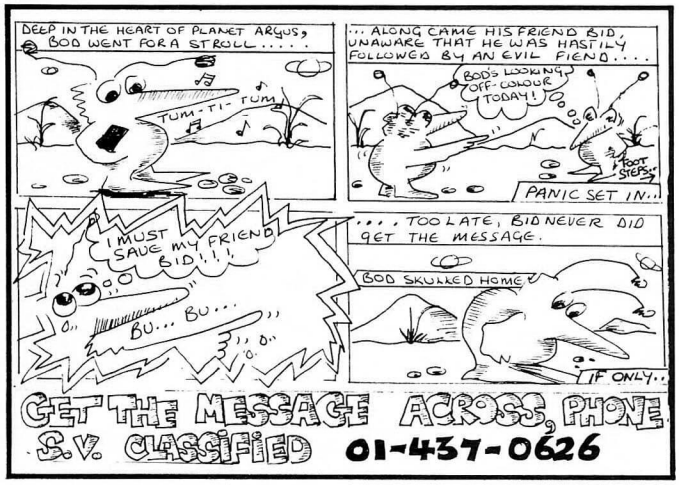
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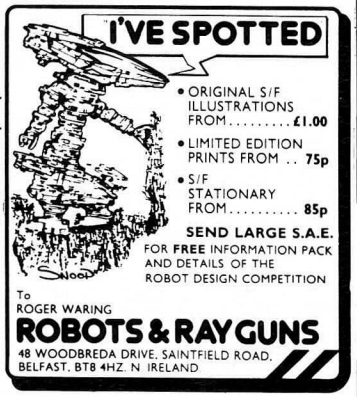
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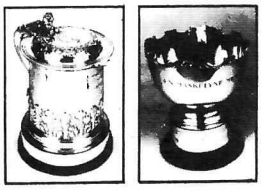

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# SPACE SOC POWER

*Continued from page 45*

Most of our politicians limit their interest though, to communications, where Britain is already making money. There is little understanding of the importance of space manufacturing, even though hundreds of billions will be made from this in the near future. In early March NASA Administrator, James Beggs, invited Britain to support NASA's permanent manned space station in LEO. It'll be the stepping stone to almost everything higher up which may happen later. Britain's future in high tech is based mainly on electronics and biotech industries, both of which will be altered beyond recognition by space processing. If we are not part of this we won't be able to compete with those who are, whereby we will have no future! British interest in Beggs' proposals seems lukewarm, while our European competitors are much more receptive. We have until the end of August to end of November to make up our minds. Time is running out.

### Postal pressure

FS4 may be too small to do much on its own, but with readers of *Space Voyager*, we certainly could. Get a plain white post-card and address it to:- Michael Marshall MP, Chairman, Conservative Party Parliamentary Space Committee, The House of Commons, Westminster, London, SW1A 0AA. Print or type your own address on the other side, then write:- Dear Sir, BRITAIN *MUST* BACK BEGGS! and sign it. Then post it NOW! This will act as a test of Britain's potential space society power, for as Honorary Vice Chairman of FS4, Michael Marshall will let us know how many cards he receives as they come in, and *Space Voyager* will be able to let you know. Also, as Chairman of the Conservative Party Parliamentary Space Committee, Mr Marshall may be persuaded to bring the results to the attention of Kenneth Baker MP, the Minister of State at the Ministry of Industry.

If every reader of *Space Voyager* takes part and we send tens of thousands of cards, the news media would begin to take note and there would be considerable publicity, making it difficult for the Government not to back Beggs.

Do send your cards to Michael Marshall though, not direct to Kenneth Baker, so that we know how many are received. Don't forget the 'Dear Sir', it pays to be polite. Print or type, so your card can be read easily. Put your own address on your card – anonymous cards are counter-productive. Don't send more than one card, as that discredits the whole procedure, but do persuade all your friends to send cards as well. We need as many as we can get. Write only the prescribed words on the card, or it may not be understood that it is part of the write-in, and don't expect a reply.

If we succeed in persuading the Government to back Beggs, for a few pence you will have helped save our high tech future, and possibly opened up a road to the stars for future Britons.

*'There is a tide in the affairs of men, which if taken at the flood, leads on to fortune . . .''*

# BRITISH SPACE SHUTTLE

*Continued from page 56*

To show how flexible the design was, an extra booster unit could be added for heavier payloads, or even to go into orbit and then on to maybe the moon or planets, since it could achieve orbit with a full fuel load if desired. Re-entry for MUSTARD was much easier as well. With the larger ship coming in more slowly, heat problems were not so great. Result – no tiles or one-off heat shields, as they were simply not necessary.

*'We calculated that cost break-even was after 50 or 100 missions, with major refurbishment for the orbital body after between 25 to 50 missions, and 200 missions between service for the boosters.'*

The design work for MUSTARD was all completed in 1964 and 1965, several years before the Americans started working towards their own shuttle design. But, unfortunately, as is the case with so many pioneering designs and inventions in this country, the Government at the time decided not to take us into space – otherwise MUSTARD would probably have flown some years before Shuttle and cornered the market.

It was about two or three years after that that the Americans suddenly became interested in a re-usable spacecraft. In 1970 BAC was invited to join a study team led by North American Rockwell and was able to contribute its experience of large airframe manufacture and of supersonic passenger craft – gained from Concorde.

*'I think that part of the problem with MUSTARD being dropped is that it was so far ahead of its time. There was a lack of political will in the UK in particular as well as Europe in general. Now the money has gone into Ariane – a non-re-usable rocket – and they're talking about a shuttle . . .'*

*'There is nothing worse than being right at the wrong time.'*

Tom Smith himself is only 56 years old. He arrived at Warton in 1949 after completing his Aeronautical Engineering degree at Queen Mary College, London in two years and is now head of Advanced Technology at Warton. He is a Fellow of the British Interplanetary Society and used to sit on their committees.

In his spare time he makes model aircraft – very special ones in that they are not radio controlled but programmed to fly totally independently, to the amazement of by-standers.

He has become philosophical over the years about the loss of what was a brilliant lead in space transport developed by him and his team, but no-one who hears him talk can doubt that it still hurts – and anyone who looks at the artist's impressions of MUSTARD will surely agree that she looks a whole lot better too.

One final footnote. For many years Mr Smith had a model of MUSTARD on his desk, but a few years ago that one and only model was given to the Smithsonian Museum.

# NEXT ISSUE

### STAR TREK III

*The Search for Spock* is said to be the best *Star Trek* movie to date, directed by Leonard Nimoy and with the most impressive special effects. You can judge for yourself soon. Randy Lofficier reports from Hollywood on the American release of this latest SF movie blockbuster.

### RETURN TO THE MOON

How and when will we return to the moon? David Hardy maps the course of the second wave of lunar exploration in a feature illustrated with his superb paintings.

### PATRICK MOORE

All good things must come to an end, but what happens when our Sun or any other star reaches the end of its life? What determines whether it will become a White dwarf, a neutron star or a Black Hole. Patrick Moore describes the death of a star.

### MODEL-MAKING

In a series of features devoted to model-making, we cover a range of model building techniques – from scratch-building and conversions to building standard kits. Wendy Ingle explains how to convert standard figures to suit your own requirements – Dr Who, Darth Vader or a Blake's 7 Federation Trooper. Readers' experiences of model building are also featured. And two more of the Revell History Maker Series are reviewed – The Jupiter C rocket/launch tower assembly and the Apollo lunar spacecraft.

### THE MAKING OF DREAMSCAPE

What would happen if you could invade another person's dreams and participate in them at will? And how would you portray the story on the big screen? Those were the problems faced by Bruce Cohn-Curtis, producer of the feature film, *Dreamscape*. In an interview with Randy and Jean-Marc Lofficier, Cohn-Curtis and special effects designers, Craig Reardon and Pete Kuran, reveal how those problems were tackled and solved.

### AND MORE . . .

All this plus the regulars – your letters in Communications Bank and Databank, with space news from America, Europe and the Soviet Union.

Issue No 11

October/November

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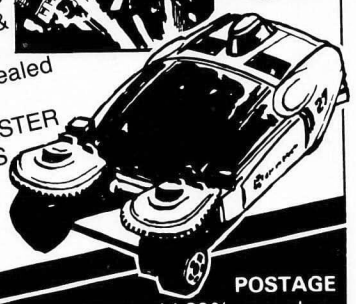
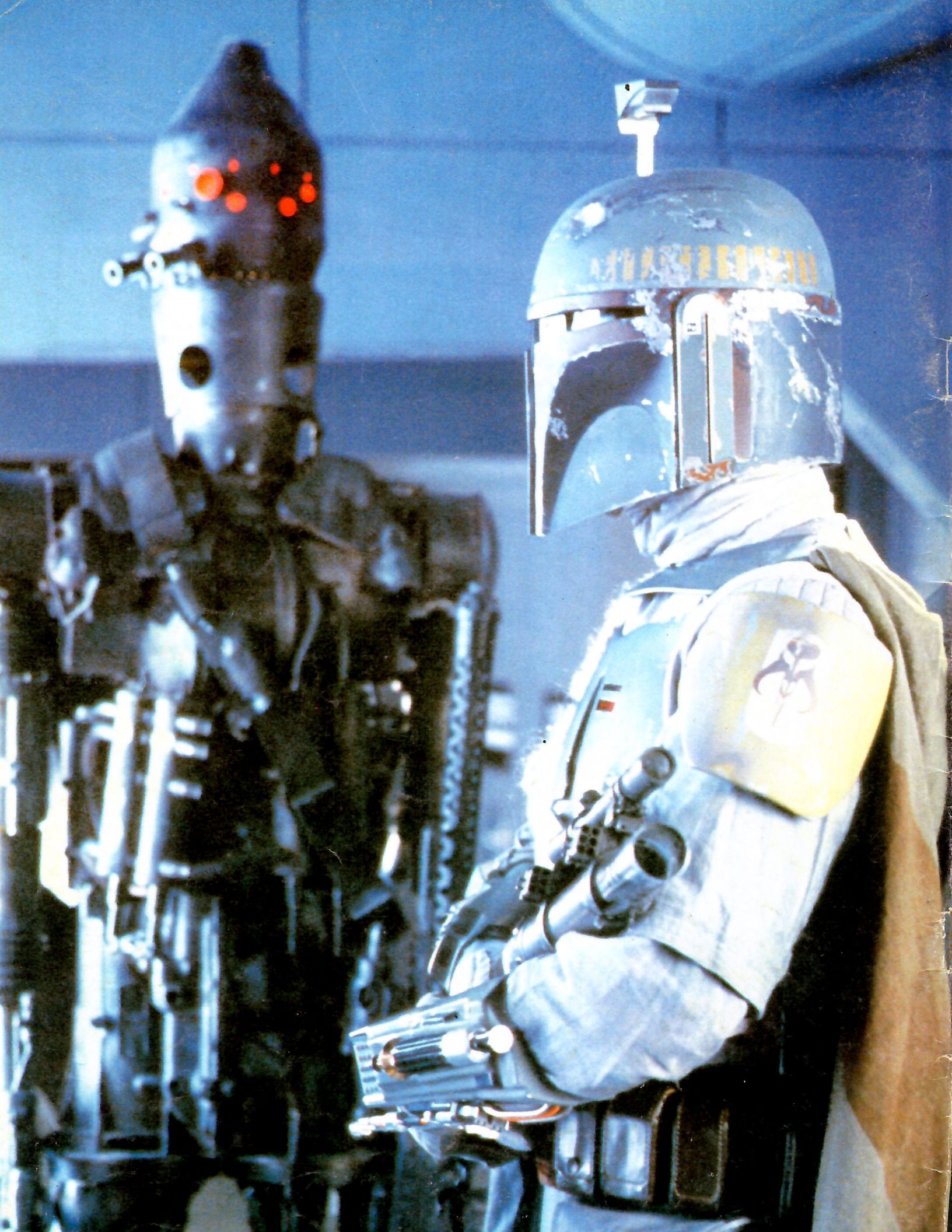
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